FOR
BETTER MANAGEMENT
OF
PLANT OPERATIONS

FACTORY

april 1960
PRICE ONE DOLLAR
A McGRAW-HILL PUBLICATION

THE COMING MARVELS IN BUILDING MATERIALS
p. 94

STOP MISUSING MANAGEMENT MEETINGS
p. 210

COVER STORY
MANAGED COSTS—SMALL PHRASE, BIG SAVINGS
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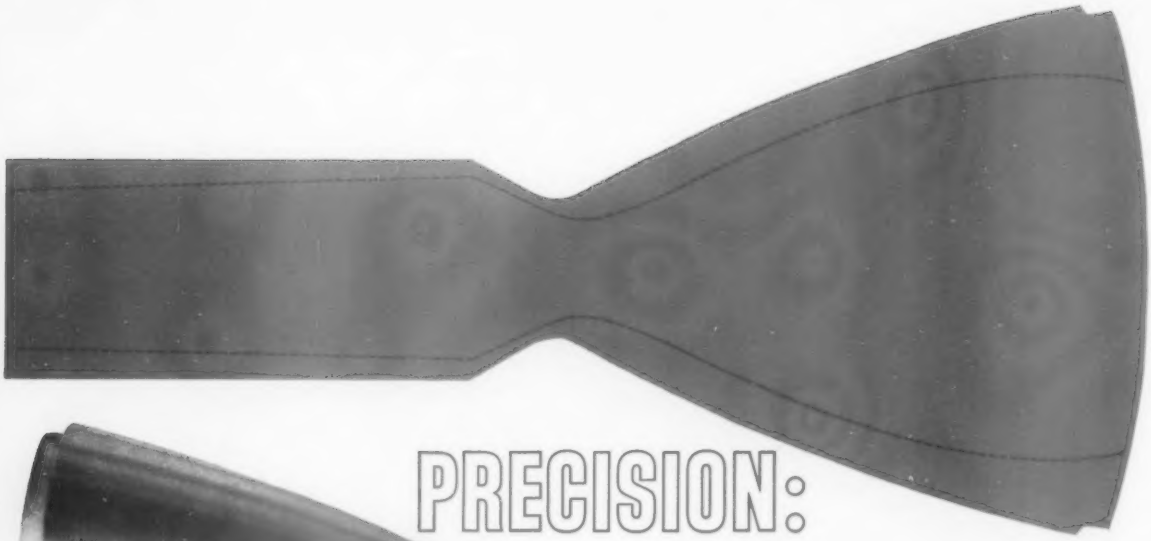

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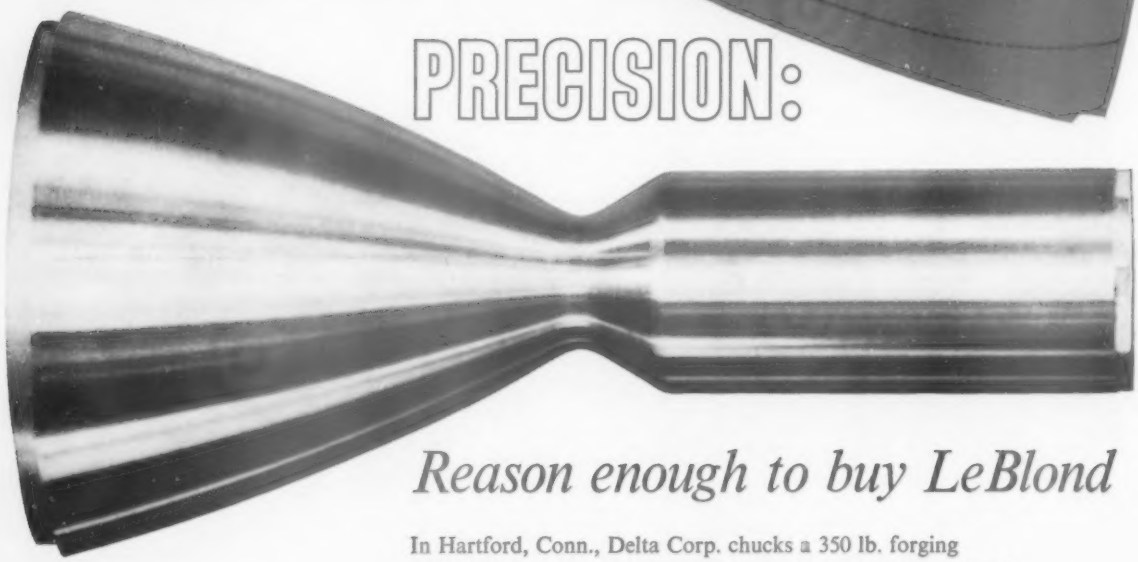
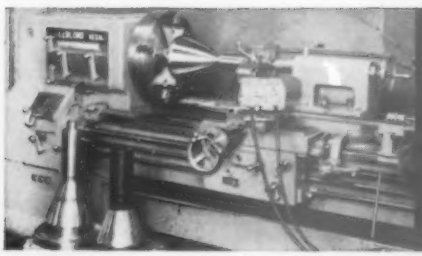


Reason enough to buy LeBlond

In Hartford, Conn., Delta Corp. chucks a 350 lb. forging of 347 stainless in its tracer-equipped, 24″ LeBlond Regal Lathe. Delta is a specialist in precision sheet metal weldments and exacting machining jobs. When this job comes off the Regal it will be a contoured tube weighing only 18 lb. Its walls will vary in thickness from ⅛″ to 1/16″ according to a rigid and complex pattern. Wall thickness will be held to ±.003″; ID to —.001 +.000; OD to ±.008; and finish will be 20 to 30 rms. If the job is run 3 or 30 times, the same precise result will be achieved—reason enough to buy a LeBlond.

You never hesitate to put this kind of work on a LeBlond Lathe. You know that the sturdiness, the horsepower, the precision is there when you need it. It's what you'd expect from the world's largest builder of a complete line of lathes (and of tracers for lathes, too.)

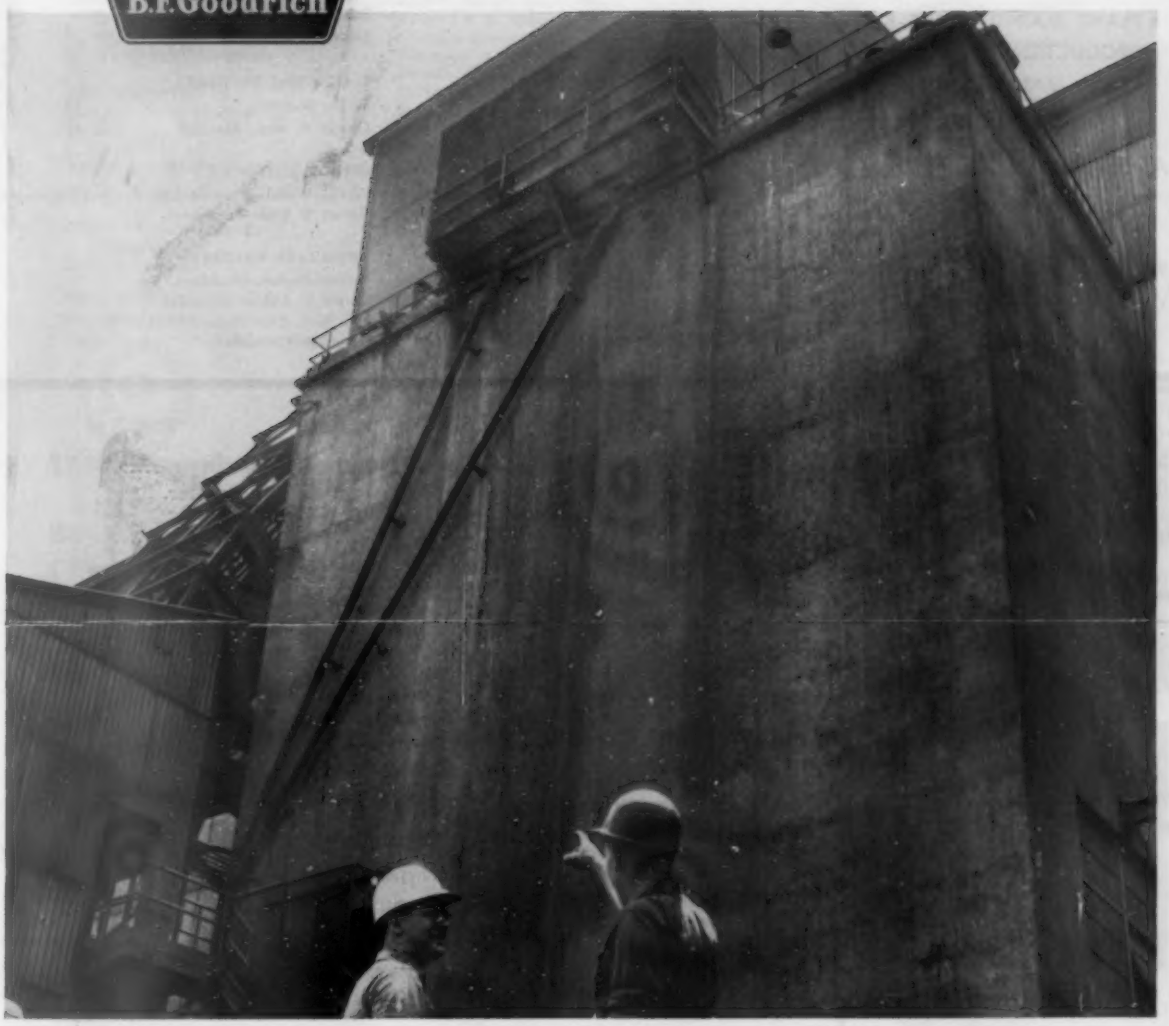


THE R. K. LeBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

LeBLOND *of Cincinnati*

For more facts circle 382 on **READER SERVICE CARD**

B.F.Goodrich



Hose outlasted pipe 7½ years

B.F.Goodrich improvements in rubber brought extra savings

THE tubes going down that wall aren't metal pipes but hose. A mixture of fly ash and acid water with sharp slivers of metal in it had been eating holes in pipe within six months. Each pipe replacement cost $700 plus about 100 hours of workers' time.

Then B.F.Goodrich hose was put on the job, had been there 8 years when the picture was taken. This is a kind of hose with a lining so tough it has been used in some places to handle broken glass and granite chips.

Smart plant engineers and purchasing men, working with a B.F.Goodrich distributor, had decided to try this special hose instead of pipe. By lasting 7½ years longer than pipe, they now figure that the B.F.Goodrich hose had saved $6400 in replacement costs and $4800 worth of maintenance time.

The hose is at a steel company's power plant. It gulps thousands of gallons of water and grit every day but shows no sign of wear, looks good for many years more.

Your B.F.Goodrich distributor has exact specifications for the B.F.Goodrich hose described here. And, as a factory-trained specialist in rubber products, he can answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Dept. M-827, Akron 18, Ohio.*

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FOR BETTER
- PLANT MAINTENANCE & ENGINEERING
- PRODUCTION
- PLANT MANAGEMENT

APRIL 1960

FACTORY

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COMING

26th ANNUAL TOP PLANTS ISSUE—In May the editors of FACTORY proudly present the Ten Top Plants of 1960. This is the package we've worked on throughout the year just past. In it you'll find stories about how the Top Plants got that way, and why they're tops in the land. You'll discover photographs to stimulate your planning, words to help speed your action. Big plants, small plants—each winner is proof that it can be done.

THE COVER

Three Westinghouse managers, Troughton, Sands, Albright (left to right), are checking progress of the company's "managed costs" program at its Baltimore X-Ray Plant.

Painting by Frank Lacano

69TH YEAR OF PUBLICATION

APRIL 1960 Vol. 118 No. 4

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MAINTENANCE COSTS: ZERO

V-CORR by Bettinger ... the only roofing and siding protected with a ceramic skin!

When you sheathe an industrial building with V-Corr it serves you longer and costs you less. You never spend a nickel on painting. You simply forget about corrosion. Or rust-proofing. Or replacing weather-worn sections.

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Write us for V-CORR BULLETIN 45 . . . filled with facts, including installation methods and descriptions of flashings.

For more facts Circle 385 on Reader Service Card

6 simple steps to savings via a Rubber Railroad Crossing

1 Nail framed risers to top of ties – to hold rubber-cushioned pads at proper height for years of smooth, quiet, maintenance-free crossing despite hard use in heavy traffic.

2 Force steel-backed rubber center pads into place over risers – their sealing lips fitting tightly against both rails for permanent, watertight, weatherproof installation.

3 Drill lag screw holes through center pads and risers into ties–providing a means of firmly anchoring the pads through year after year of heavy rail and road traffic.

4 Anchor side pads – also with lag screws–through risers into ties. They, too, form a maintenance-saving waterproof seal against the rails.

5 Insert rubber plugs into all the countersunk screw holes – a permanent barrier against seepage that might rot ties or foul ballast.

6

GOODYEAR INDUSTRIAL PRODUCTS

GIP-Specified

Molded Rubber Railroad Crossing Pads

A Thick pad of solid, tough stock for excellent resistance to cutting, wear, weather and low temperatures

B Heavy-gauge steel plate reinforcement follows contour of corrugated pad bottom

C Tough integral flanges seal tightly against tracks when pad is sprung into place

It's easy to see why the G.T.M. – Goodyear Technical Man–recommends Rubber Railroad Crossings for interplant use – especially for handling spillables or breakables. Not only is their installation easy, but they don't splinter like wood–crumble like concrete–soften up or rut like asphalt. In fact, after years of hard use, they've proved virtually maintenance-free.

For the complete story, write Goodyear, Industrial Products Division, St. Marys, Ohio, Los Angeles 54, California, or Akron 16, Ohio.

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GOODYEAR

THE GREATEST NAME IN RUBBER

For more facts Circle 386 on Reader Service Card

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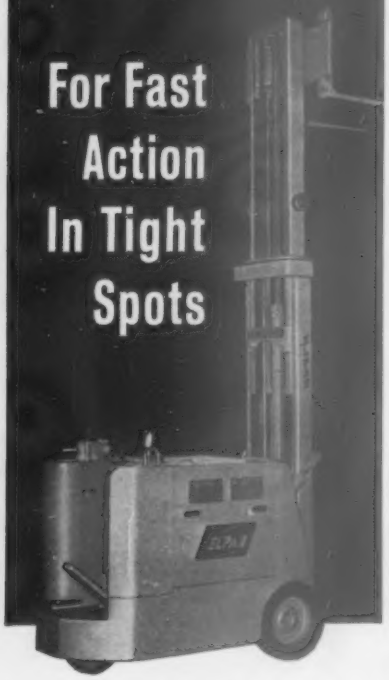
For Fast Action In Tight Spots



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FACTORY LETTERS

Readers Mull Maintenance Training

Dear Sir:

I have read the article on "Maintenance Training" in FACTORY's February issue (page 89). Good trainers will accept the criticism of your article. However, trainers are not bad because they are educated. The big task is to convert generalized training background to the specific needs of the area and the plant. The well-educated training director will coordinate all the details of such a program. It is far too big a job to be handled by a misfit, or even by a trained craftsman, as you have implied in your article.—*J. Lowell Hawkinson, Sundstrand Aviation, Rockford, Ill.*

Dear Sir:

Here are some comments on the "Maintenance Training" article in FACTORY's February issue:

I suspect most of our troubles in this field can be traced to the line organization. Top management seems to find a plethora of odd jobs for the training man which are sometimes only remotely connected to training. The lower echelons of management either ignore the trainer or fail to recognize the need for training.

I believe "on-the-job" training is most important in maintenance work, and certainly your front-line supervisors are the key men here. Possibly the biggest challenge we have is training the trainer.

Again let me emphasize that the line organization has the primary responsibility for a well-trained work force, but we can use all the help that's available.—*Ralph N. Price, superintendent of maintenance, Columbia-Southern Chemical Corp., Corpus Christi, Tex.*

Dear Sir:

There are too many men in industry today who, like the fictional Mr. Wilson in your "Maintenance Training" article, hold positions of highly skilled craftsmen by virtue of seniority. They fail to keep in touch with modern technical advancement, and should not, in my opinion, be classified as highly skilled. It is not entirely their fault—there are just no schools available for specialized training.

Training skilled craftsmen and keeping them currently trained with modern techniques is a problem that must be approached by both management and unions. Labor should recognize the cost of maintenance and preventive maintenance. And it should realize that management should not be called upon to pay high rates of pay to men whose skills have never advanced beyond their apprenticeship training.

Union contracts should contain a much wider diversification of a craftsman's skills, and remuneration for these skills should be made accordingly. This would provide an incentive to the worker to keep pace with technical advancement.

Management should recognize the value of having up-to-date and highly skilled labor available at all times, and should be prepared to contribute to the cost.—*R. Dodds, plant manager, International Resistance Co., Toronto, Ont.*

Dear Sir:

In our opinion, the criticism of training departments (the subject of FACTORY's February "Maintenance Training" article) stems from a basic misconception of such departmental functions. The staff personnel of a training department should be concerned primarily with

Frank C. Botch:
Field Service Supervisor

George Rackle & Sons proved it in the case of the

CONCRETE TORTURE CHAMBER

Staggering overloads, constant moisture and gritty concrete dust create a torture chamber for ELPAR electric trucks operating at the Cleveland plant of the George S. Rackle & Sons Company, the nation's leading fabricator of pre-cast concrete products.

Despite the rugged conditions, Maintenance Superintendent Ernie Hammerbacher says: "Our four ELPAR trucks do their jobs at 30% less maintenance costs than other kinds of trucks."

He says: "They're only rated for 4,000 pounds capacity but every one of them has handled 6,000 pounds without damage. That's a 50% overload."

"Part of their outstanding maintenance record comes from their ability to work well in areas where dust and moisture would clog and wear out other types of trucks . . . part of it is due to the fact that they're just plain tough!"

Whether you want to handle concrete slabs or ping pong balls, the built-in dependability and low cost maintenance of ELPAR trucks are extra values you can't afford to miss. You may not be able to see them but if it's an ELPAR electric you can be certain they are there.

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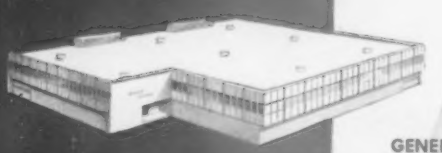
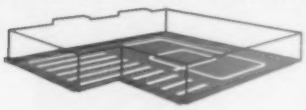
Leading producer of electric powered fork, platform and crane trucks

with
Faultless
Casters You Can Utilize Production Space Efficiently . . . and Change Plant Layout as Needed!



Today, your production line can move in a serpentine pattern

. . . tomorrow it can be changed to a straight-line or circular flow



A fluid Faultless Castered production line is quickly reshaped as needed . . . to suit new products, design changes, retooling, time-and-motion study recommendations, etc. Also Faultless Castered trucks, dollies, racks, carts can transport your manufactured products outdoors for yard stocking. Whatever your production line load requirements, floor surfaces, space limitations, Faultless engineers the precision casters to meet your specific requirements and limitations.

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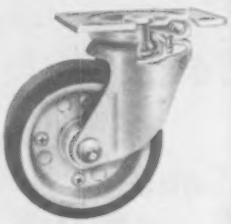

HEAVY DUTY SERIES H900 CASTER

EXTRA-HEAVY DUTY SERIES 1300 CASTER

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the organization and operation of the department. But the actual teaching and instruction, particularly of special skills such as electronic trouble shooting, must be done by persons who have both a theoretical and practical knowledge of the subjects they are teaching.—*S. W. Stouffer, asst. director, Construction and Maintenance Div., Jones & Laughlin Steel Corp., Pittsburgh.*

Dear Sir:

I have read with much interest FACTORY's article on maintenance training by George A. Hoy.

Of particular interest were the four illustrations (on page 92) of the four steps used in maintenance instruction.

These four steps have been used extensively by our company in the development of our personnel, both supervisory and production.

Results have been very good and we plan to continue the four-step approach until a superior method comes along.

So, thanks to FACTORY and to Mr. Hoy for a most timely feature, one that can be successfully applied in every industry, no matter how specialized, how large, or how small.

I am positive that each industry giving this program a fair trial will be very satisfied with the results.—*Ernest R. Linebaugh, production manager, Eastern Div., Inland Homes Corp., Hanover, Pa.*

Dear Sir:

Your article on maintenance training was certainly informative and well done.

As a promotional agency for the furtherance of apprenticeship and training in industry, we often like to circulate reprints of such an article. We would appreciate an estimate on the cost of reprinting 5000 copies of it.—*Howard B. Gundersen, executive director, Technical Services, Bureau of Apprenticeship and Training, U. S. Department of Labor, Washington 25, D.C.*

Turn the page

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For more facts Circle 390 on Reader Service Card ➤

Gibson Fixtures Give You
More Than Good Lighting...
Much More!

ARCHITECT, MASTIN & SUMMER; ELECTRICAL ENGINEERS AND CONTRACTORS, CLEVELAND ELECTRIC COMPANY; GENERAL CONTRACTOR, IRA H. HARDIN COMPANY

GIBSON "PLUG-IN" FIXTURES SIMPLIFY MAINTENANCE FOR AMERICAN ART METALS

American Art Metals Company, Atlanta, uses Gibson fixtures with Power Groove lamps throughout its new plant. "We particularly like the ease of maintaining these fixtures," says E. L. McNiff, general works manager. "When a conventional fixture needs servicing, an electrician may spend half an hour or more up on a ladder to do the job. This distracts production workers. But when one of our Gibson fixtures needs attention, it is simply unplugged and another 'plugged-in' in its place—in the time it takes a man to climb a ladder."

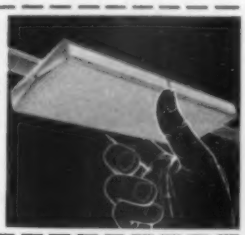
The exclusive "plug-in" feature of Gibson fixtures also offers substantial savings in installation costs and allows for re-spacing of fixtures and increasing lighting intensities any time without re-wiring.

Write for complete descriptive literature

GIBSON

Gibson LIGHTING

Makers of
THE FIXTURES
THAT JUST
"PLUG-IN"
PAT. PENDING



COMMERCIAL, TROFFERS, INDUSTRIAL

GIBSON MANUFACTURING COMPANY
1919 Piedmont Circle, N. E., Atlanta 9, Georgia

sprays or flows the new MULTIPLE COMPONENT MATERIALS for finishing, coating or build-up

Binks new TURBULATOR spray gun and FORMULATOR are a major break-through in the spray application of a whole array of catalyzed epoxy coatings and casting resins . . . polyester gel-coats and reinforcing resins . . . foam-in-place materials and other synthetic coatings requiring a catalyst.

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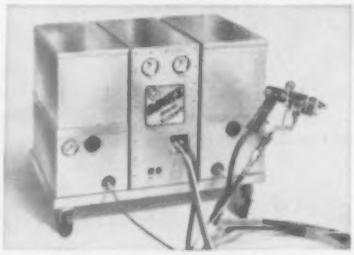
The FORMULATOR provides a self-contained reservoir for resin and catalyst materials. It accurately meters and proportions the flow and volume of each material to the TURBULATOR spray gun.

Operation is simple . . . only basic instruction is necessary.



Binks new TURBULATOR gun and FORMULATOR equipment package opens up vast new areas of finishing, coating and build-up material technology . . . for the first time really places this technology at your disposal . . . opens up exciting new production possibilities never before practical.

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My Feelings Exactly

Dear Sir:

Many thanks for your article, "Managed Maintenance" (January 1960 FACTORY, page 64). It was indeed timely for me, since I've recently been named manager of the plant engineering department here.

Your article repeated many of my own feelings about maintenance in this mechanized production era.

Our company's business is manufacturing electronic vacuum tubes for radio communication systems and radar. And my responsibility is to raise the stature of plant engineering and maintenance, much as your feature describes.

Your comment on preventive maintenance (PM) leading directly into corrective maintenance (CM) is extremely thought-provoking.—*Joseph D. Bianco, manager, plant engineering department, Vacuum Tube Products, Oceanside, Calif.*

Number One

Dear Sir:

I have just read your February 1960 issue from cover to cover. I note a number of new features which further enhance my feeling that you have the number one industrial magazine.—*A. C. Wedge, vice president for manufacturing, DeWalt Div., American Machine and Foundry Co., Lancaster, Pa.*

FACTORY

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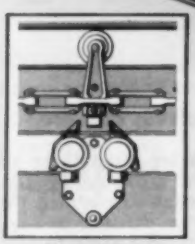
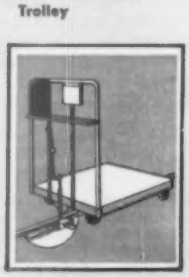
EVER MEET THE FAMILY?

Trolley


Power & Free

Automation


Towveyor

The Jervis B. Webb Company is in its 40th year of designing, manufacturing and installing custom engineered conveyor systems. We have also acquired a fine family of diversified industries that complement each other to provide complete customer service.

Each member of the family is a separate organization with highly skilled personnel who specialize in designing, manufacturing and installing: cranes and monorail systems; bulk handling systems; universal test equipment; and close tolerance forgings. End products differ, but the prime objective is the same—better production at lower cost.

WEBB

JERVIS B. WEBB COMPANY

8939 ALPINE AVENUE • DETROIT 4, MICHIGAN
SPECIALISTS IN CUSTOM CONVEYOR SYSTEMS

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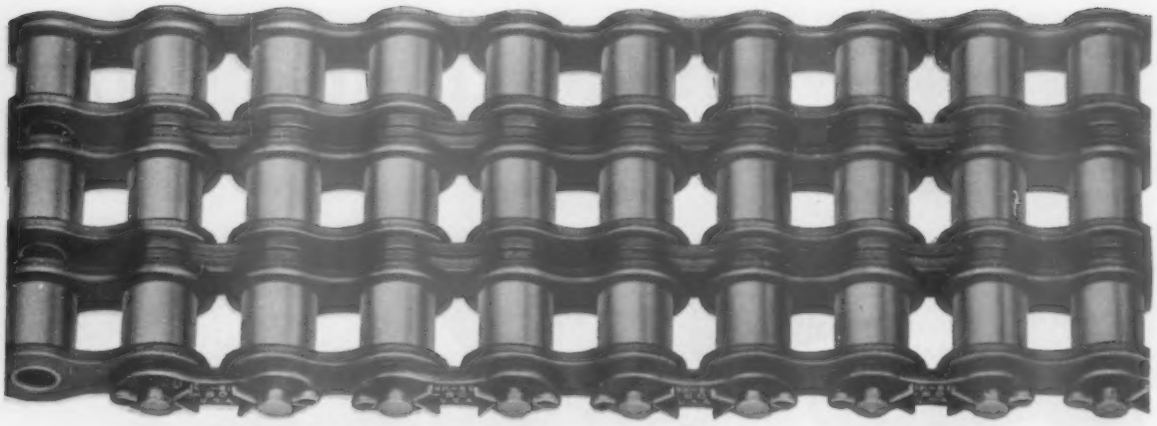
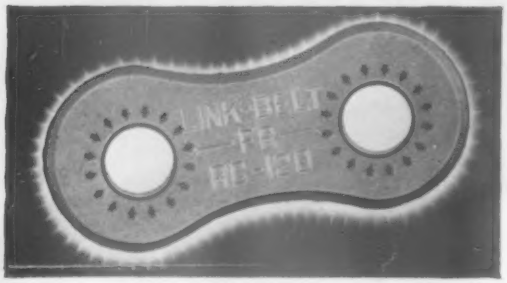




Arrows indicate critical areas treated with compressive stresses to improve fatigue resistance.

Fortified against fatigue

65 TONS OF CYCLIC TENSION! With this equipment—largest of its kind known to be in operation in roller chain testing—Link-Belt tests and rates roller chains. Rapid "stress-on, stress-off" action duplicates operating conditions at a greatly accelerated pace . . . proving over and over that Link-Belt chains are fortified against fatigue.

Link-Belt offers special FR® processed roller chain for applications involving repeated high-tensile loads

Jobs too rugged for standard roller chains are taken in stride by Link-Belt FR roller chain. Through its patented FR process, Link-Belt gives *greater dynamic strength* to the larger sizes of chain most likely to encounter severe cyclic loading. FR greatly raises the chain's endurance limit by compressing metal around pitch holes—the critical sidebar areas most vulnerable to fatigue failure.

The FR process results from the same design and metallurgical research that has produced many more "extras", all *standard* in Link-Belt roller chains. They include shot-peened rollers, close heat-treat control, lock-type bushings and others. For further details on Link-Belt roller chains, send for Book 2657.

LINK-BELT

10,070

ROLLER CHAINS AND SPROCKETS

BOOK 2657 has 154 pages of roller chain data. For your copy, contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

He's carrying a day's supply of towels for a plant of 500

Steiner Company American Automatic paper towel dispenser. Holds roll of 500 towels.

When a maintenance man can carry a whole day's supply of towels under one arm, it proves two things. One, you cut towel costs because it doesn't take many roll towels to supply the needs of a plant of 500 employees. Two, maintenance costs are reduced because keeping washrooms supplied with towels takes little time. Steiner Company controlled towel dispensers assure you of these advantages. With these cabinets you determine the rate at which towels are dispensed . . . the best rate to keep washroom traffic moving and to keep employees or customers satisfied with service. For details contact . . .

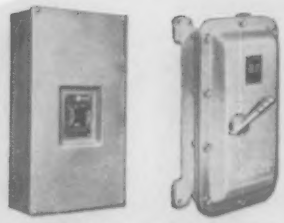
STEINER

STEINER COMPANY

Dept. 60-3, 740 Rush Street, Chicago 11, Illinois

For more facts Circle 394 on Reader Service Card

Safety Switches for Normal and Hazardous Locations



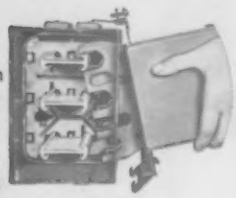
Industrial Circuit Breakers for Normal and Hazardous Locations

Load Centers—Circuit Breaker and Fusible

D ...design leadership D ...design

Fusible and Circuit Breaker Lighting and Power Panelboards

Power Distribution Switchboards and Switchgear

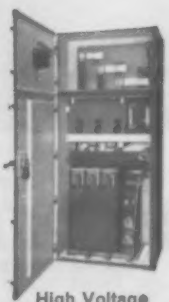


Plug-In Duct

Feed-In Duct

Motor Control Centers

Synchronous Motor Starters



High Voltage Starters

Wireways

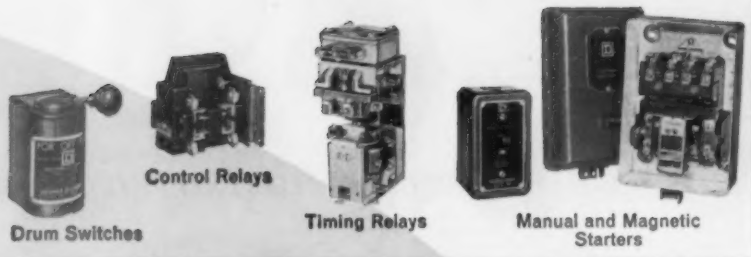
Field Engineering Service

is available through more than one hundred Square D offices, backed by an international network of over 1000 authorized electrical distributors and 19 plants in the United States, Canada, Mexico and Great Britain.

Executive Offices • 6060 Rivard St., Detroit 11, Mich.

Special-Purpose Control

D SQUARE D COMPANY



A *Complete* LINE OF ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

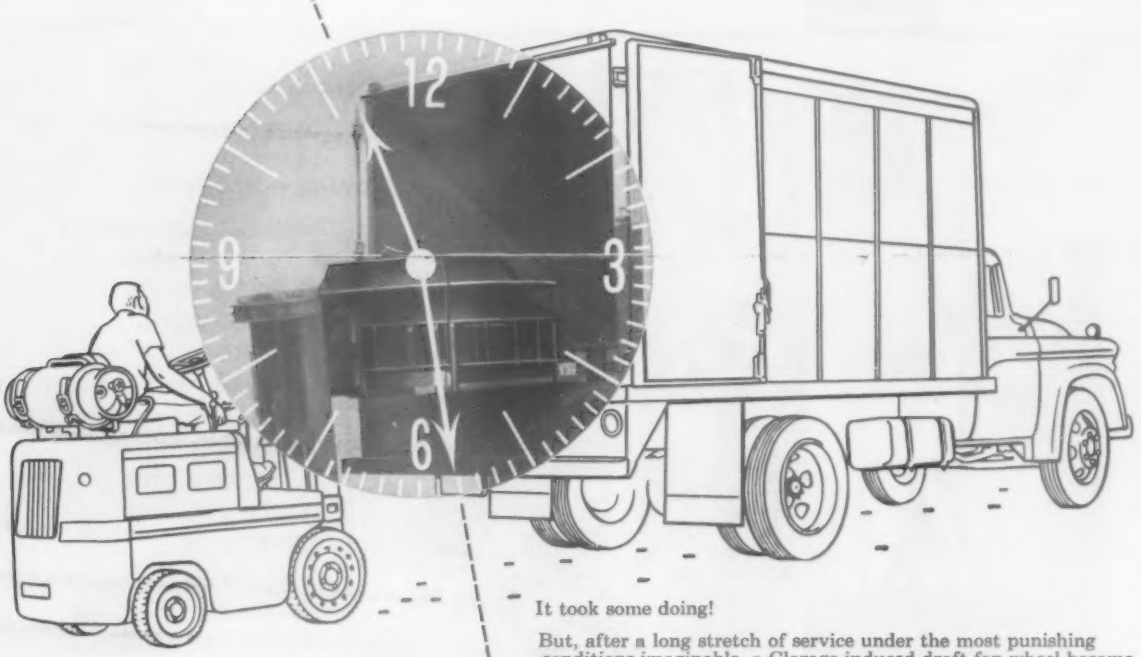
eadership D ...design leadership

- ADJUSTABLE SPEED DRIVES
- BUSWAYS & WIREWAYS
- CIRCUIT BREAKERS
- CONTROL CENTERS
- CRANE & HOIST CONTROL
- DISTRIBUTION SWITCHBOARDS
- ELECTRIC TRUCK CONTROL
- HIGH VOLTAGE CONTROL
- LAUNDRY CONTROL
- LIFTING MAGNETS
- LIGHTING AND POWER PANELBOARDS
- LIGHTING CONTROL—LOW VOLTAGE
- LIMIT AND FOOT SWITCHES
- MACHINE TOOL CONTROL
- MAGNETIC BRAKES
- METER MOUNTINGS
- MOTOR STARTERS
- PRESS CONTROL
- PRESSURE, FLOAT, & VACUUM SWITCHES
- PUSHBUTTONS
- RELAYS AND CONTACTORS
- RESISTORS
- SAFETY SWITCHES
- SERVICE ENTRANCE EQUIPMENT
- STAGE DIMMERBOARDS
- STEEL MILL CONTROL
- SWITCHGEAR & UNIT SUBSTATIONS
- SYNCHRONOUS MOTOR CONTROL
- TERMINAL BLOCKS
- TEXTILE MACHINE CONTROL
- TIMERS
- VOLTAGE TESTERS
- WELDER CONTROL

wherever electricity is distributed and controlled

CLARAGE

....exceptional service measured by the customer's clock



In just 30 hours this Replacement Fan Wheel was built and on its way!

It took some doing!

But, after a long stretch of service under the most punishing conditions imaginable, a Clarage induced draft fan wheel became worn out by corrosion.

This fan's operation was vital to both the customer and the insurance company whose business interruption policy was in effect. Prompt replacement of the wheel was imperative.

Here, too, it took some doing!

The original hub was returned to Clarage by air at 10 a.m. on Tuesday. Manufacture of the rest of the wheel had already begun. Thirty hours later—at 4 p.m. on Wednesday—a new 1300 pound precision built wheel and 400 pound inlet cone were being loaded at the Clarage plant for delivery to the airport.

Back at the customer's plant a Clarage service representative was ready for the arrival of these replacement parts. His on-the-scene assistance expedited the return to operation of the fan.

Result: another customer (plus an insurance company) impressed by Clarage's all-out service.

Dependable equipment for making air your servant

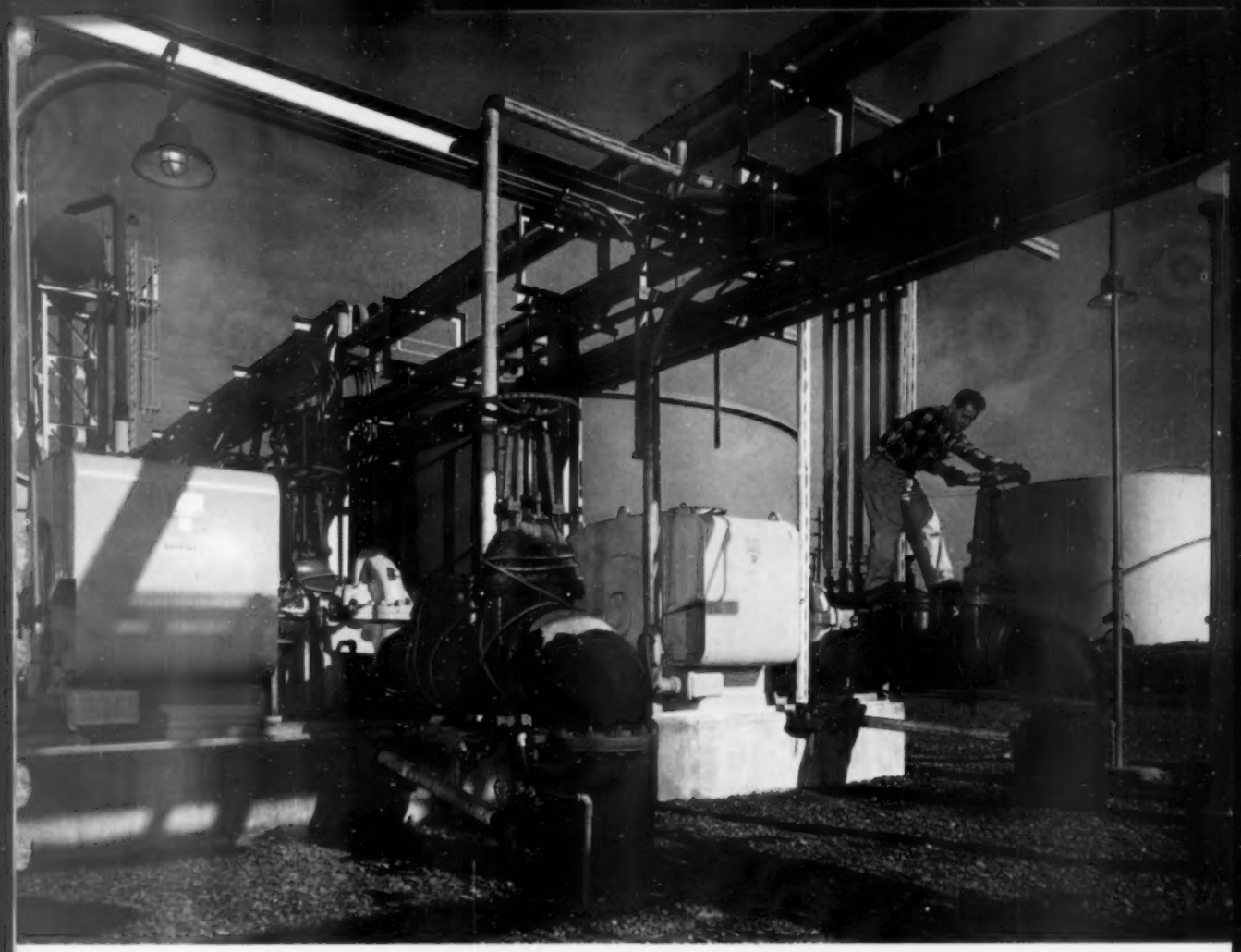
CLARAGE FAN COMPANY

Kalamazoo, Michigan

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts Circle 396 on Reader Service Card

For more facts Circle 397 on Reader Service Card ➤



CONTROL CORROSION

Severe weathering, critical chemical exposures even at elevated temperatures, and many other corrosion problems can be controlled by a Truscon system specifically engineered for the job. Maximum protection at the lowest cost per square foot per year is the prime consideration of every Truscon recommendation.

When you consult Truscon you get a written specification for proper surface preparation and painting, plus assistance in application and inspection methods. Interior or exterior surfaces, metal or concrete, machinery, buildings, bridges, or tanks, can all be protected by a Truscon coating system. Call the branch nearest you or write Truscon Laboratories for specific information.

TRUSCON *Laboratories*

Industrial Maintenance Division of
Devoe & Raynolds Co., Inc.
Detroit 11, Michigan

Resists the Penetration of Water
Protected with TRUSCON

"Our materials handling efficiency jumped 30%!"

Motorola "Dispatcher" 2-way radio ends lift truck "dead-heading" at Lennox Industries

No wonder Tom McRae, Time & Methods Dept. Mgr., is enthusiastic about his new Motorola Industrial "Dispatcher" 2-way radio system. It has not only increased lift truck productivity to almost 100% efficiency, but will actually *pay for itself* in a few months! This fact alone is a tremendous boon to companies in highly competitive industries, such as Lennox, leader in the home heating and air conditioning field. But, Motorola bonuses do not stop here. Mr. McRae further reports that *three* radio-equipped trucks now do the work that formerly required *five!*

Can this kind of savings help you?

Why did Lennox specify Motorola? Three good reasons: 1) No mounting problems; the Dispatcher radio is the smallest mobile industrial radio available; 2) No special generators or batteries, because this radio needs only ⅛ the current required for other radios, and 3) Motorola's reputation for reliability.

Check for yourself. Talk to the man from Motorola, or write for literature on the Dispatcher radio.

MOTOROLA INDUSTRIAL TRANSISTORIZED dispatcher RADIOPHONE

Motorola Communications & Electronics, Inc., 4501 Augusta Boulevard, Chicago 51, Illinois • A Subsidiary of Motorola Inc.

For more facts circle 398 on Reader Service Card

This Patented

CLIP and STUD

makes LYON your BEST SHELVING INVESTMENT

Design makes the difference! Don't settle for less than the exclusive Lyon CLIP and STUD which many have tried to copy but none can duplicate. Fully protected by Government patents, Lyon CLIP and STUD obsoletes conventional steel shelving and guarantees you these *extra dividends*—

★ Easy, fast, low cost assembly.

★ Complete flexibility—shelves instantly adjustable from the front without use of nuts, bolts or tools.

★ Tremendous structural strength and rigidity.

Another extra dividend from Lyon—oldest and leading steel shelving manufacturer—an experienced Lyon Storage Engineer and Lyon Dealer as near as your phone—ready to help you save space, time, money.

There is a type of Lyon Shelving for every application—open, closed, bin, counter, sliding shelf, tool, mezzanine. Above—a typical tool room installation.

LYON STEEL EQUIPMENT ®

OVER 1500 ITEMS

For Business, Industry and Institutions

MAIL COUPON FOR THE 92-PAGE CATALOG

LYON METAL PRODUCTS, INC.
412 Monroe Avenue, Aurora, Illinois

☐ I would like to see a Lyon CLIP and STUD demonstration.

☐ I'd like a copy of your 92-page Catalog which tells the complete shelving story and covers entire line of products.

NAME_____

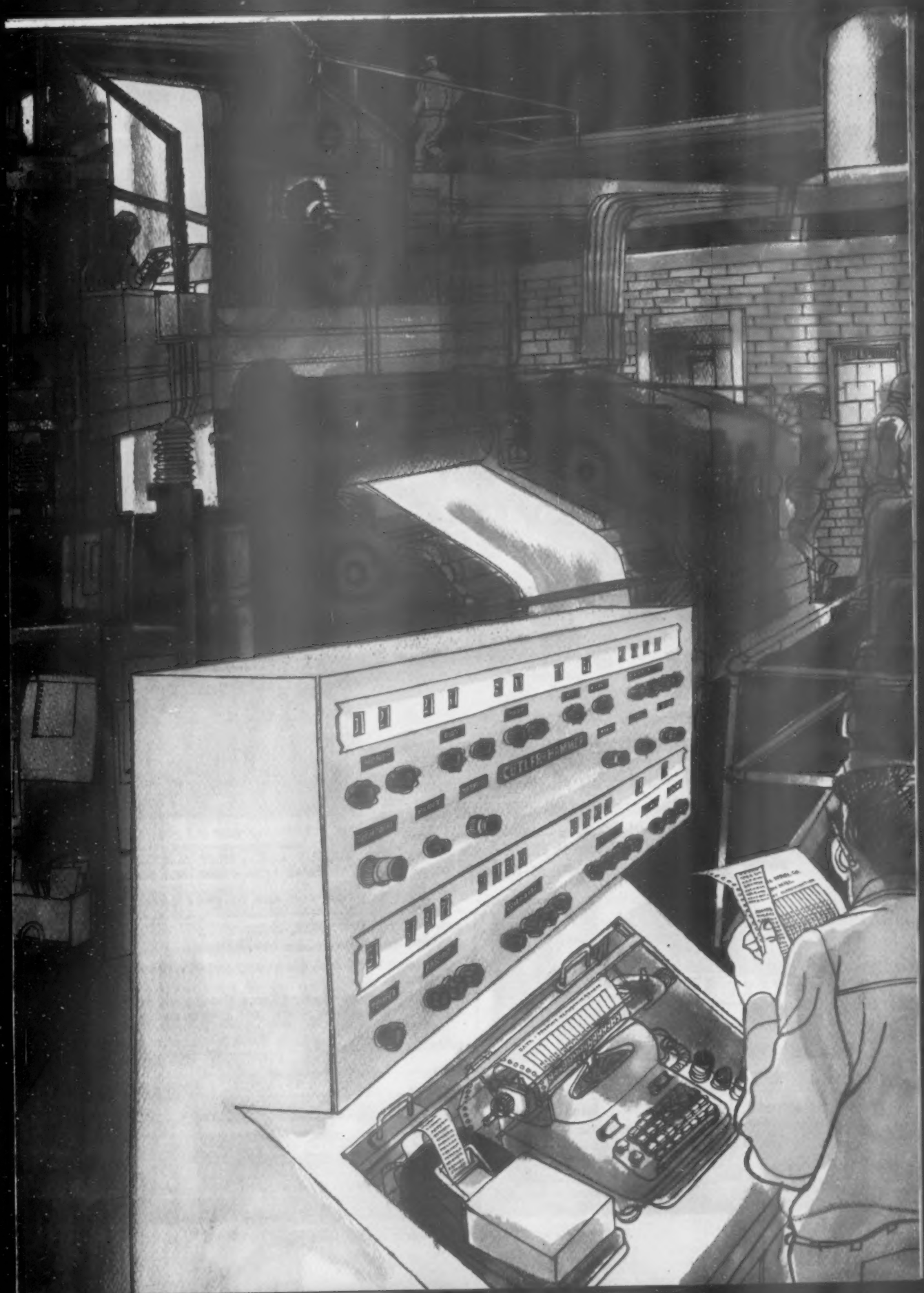
FIRM_____

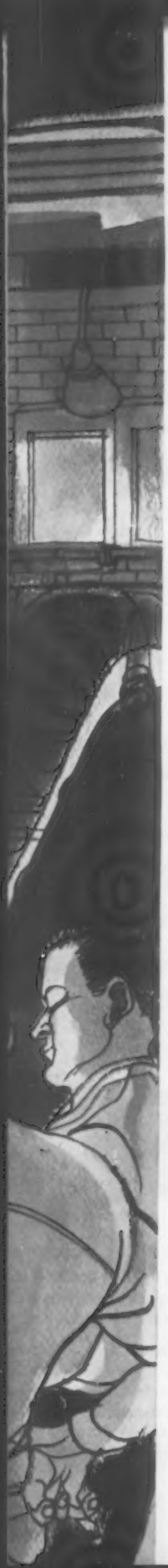
ADDRESS_____

CITY_____ ZONE____ STATE_____

A PARTIAL LIST OF LYON PRODUCTS

• Desks	• Storage Cabinets	• Bookcases	• Folding Chairs	• Sorting Files	• Tool Stands	• Cabinet Benches	• Display Equipment
• Tables	• Flat Drawer Files	• Coat Racks	• Service Carts	• Hopper Bins	• Tool Boxes	• Revolving Bins	• Hanging Cabinets
• Stools	• Drawing Tables	• Shelving	• Work Benches	• Drawer Units	• Parts Cases	• Toolroom Equip.	• Slotted Angle
• Lockers	• Filing Cabinets	• Bin Units	• Bench Drawers	• Shop Boxes	• Bar Racks	• Service Counters	• Wood Working Benches





CONTROL

New machine with a memory licks a quality problem 3 miles long!

ANOTHER NEW IDEA FROM CUTLER-HAMMER

When manufacturers started ordering up to 16,000 ft. of tinplate in one coil instead of sheets, it created a serious problem.

You can control sheet quality by running each one through sensing stations and separating them by predetermined standards. But how do you check and control quality in over three miles of tinplate that's all rolled up?

For an answer, a leading tinplate producer came to Cutler-Hammer. Working with him, Cutler-Hammer engineers devised a simple, yet ingenious solution. They developed a new type of computer that hooks onto the same sensing stations used for individual sheets.

As miles of tinplate whiz by these sensing stations *before* it's coiled, this computer remembers every defect. Then, it automatically records every defect's type and location on a tape. After checking the tape, exact quality is known. Production controls can be adjusted quickly to compensate for any deviations from standards.

What's your problem?

Cutler-Hammer is on the move. It's brimming with new products—a limit switch, for instance, that's twice as dependable as the ones you now use. It has the ideas and the engineering talent for designing systems that automatically handle everything from blast furnace charging to quality control. And the addition of Airborne Instruments Laboratory's microwave and electronic experience gives Cutler-Hammer unmatched capability in all fields of industrial automation.

The new trademark you see above symbolizes the vitality, the capacity for ideas and practical assistance you can expect from the *new* Cutler-Hammer. Phone your nearest Cutler-Hammer office to put it to work for you.

WHAT'S NEW? ASK...

CUTLER-HAMMER

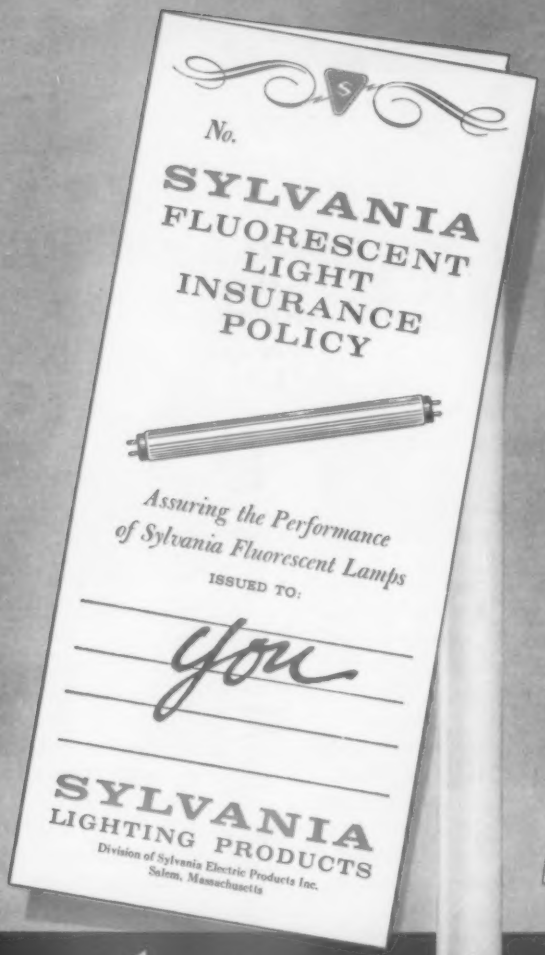
CONTROL

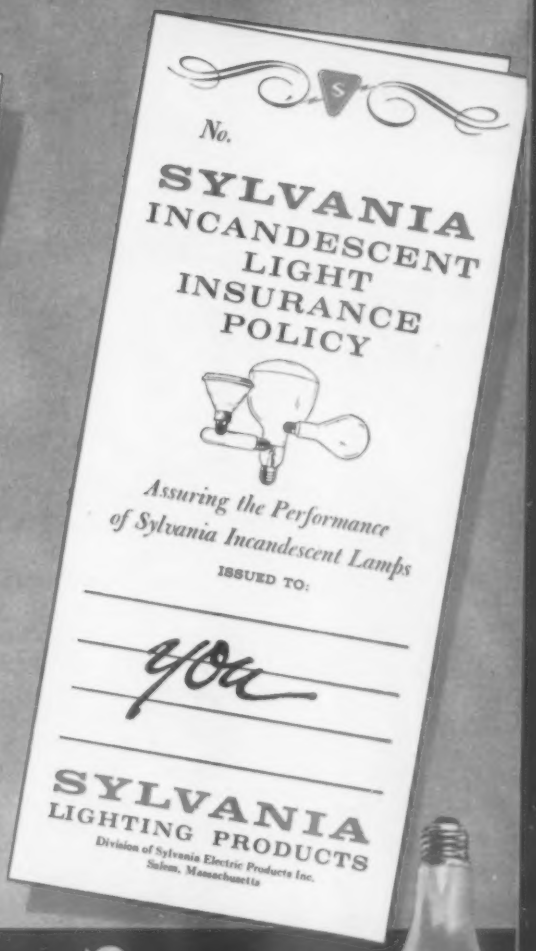
Cutler-Hammer Inc., Milwaukee, Wis. • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C.A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.; Intercontinental Electronics Corporation.

For more facts Circle 400 on Reader Service Card

Now Sylvania issues 4

AND YOU ARE





1 for Sylvania Fluorescents

2 for Sylvania Incandescents

How can Sylvania *do a thing like this?* Issue one insurance policy after another to *guarantee* that you get maximum lighting value . . . or your money back! Simple!

Because Sylvania in one lighting product after another *consistently* gives you the lowest TCL – Total Cost of Lighting – of any brand. (TCL equals cost of lamp or starter plus power plus maintenance.)

Because Sylvania lighting engineers *consistently* break the TCL barrier to bring you *more light* for less cost.

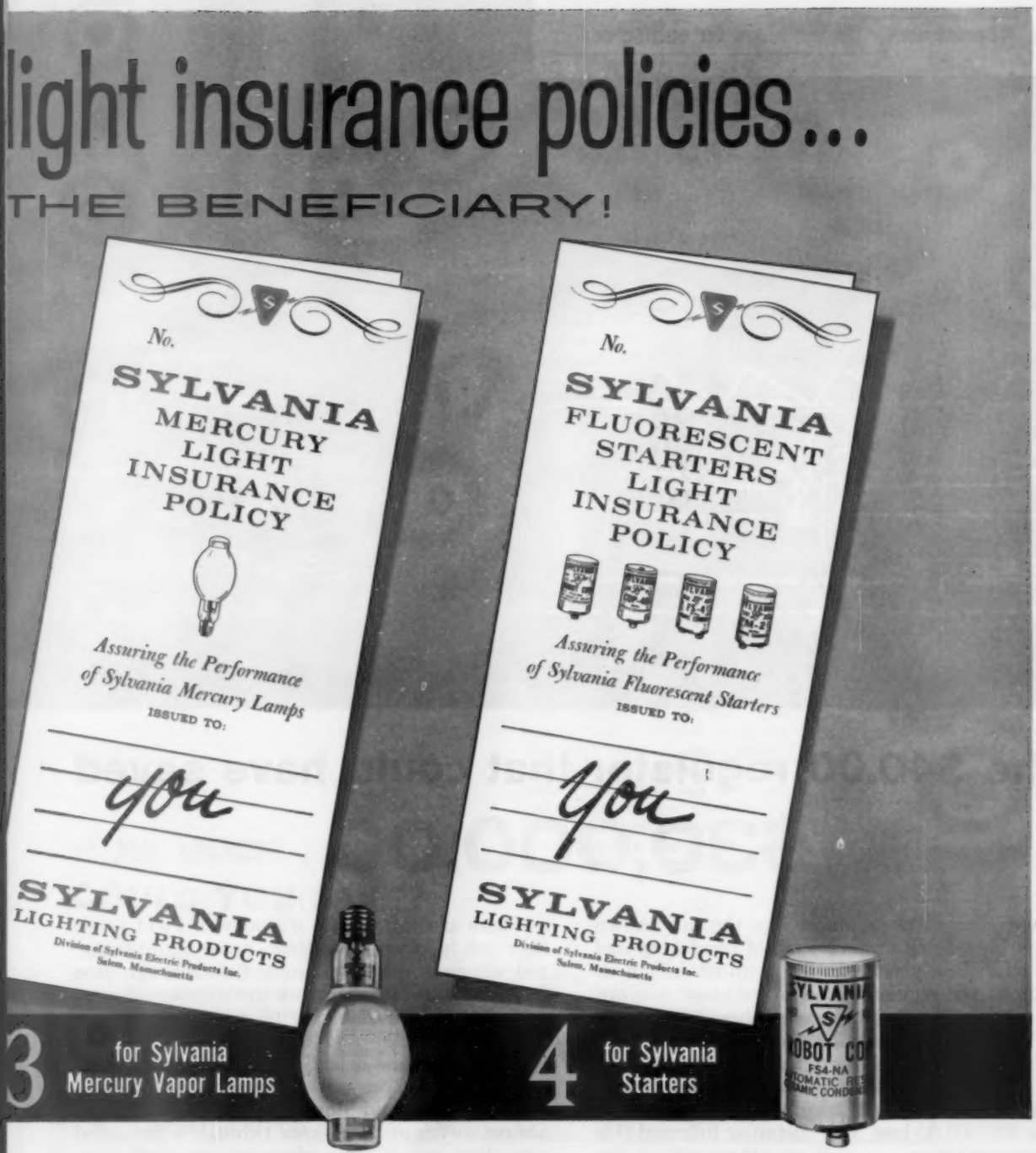
Because Sylvania—through its outstanding research and development—has been *consistently* out front in superior lighting.

There's just no question that Sylvania lighting products *do* provide top performance and will keep right on doing it! (You don't think we *want* to return your money, do you?)

Next time you buy Fluorescents, Incandescents, Mercury Vapor Lamps, or Starters, be sure your representative or supplier gives *you* your exclusive Sylvania Light Insurance Policy. Or write us: *Sylvania Lighting Products, a Division of Sylvania Electric Products Inc., Dept. 24, 60 Boston Street, Salem, Massachusetts. In Canada: Sylvania Electric (Canada) Ltd., P. O. Box 1190, Station "O," Montreal.*

light insurance policies...

THE BENEFICIARY!

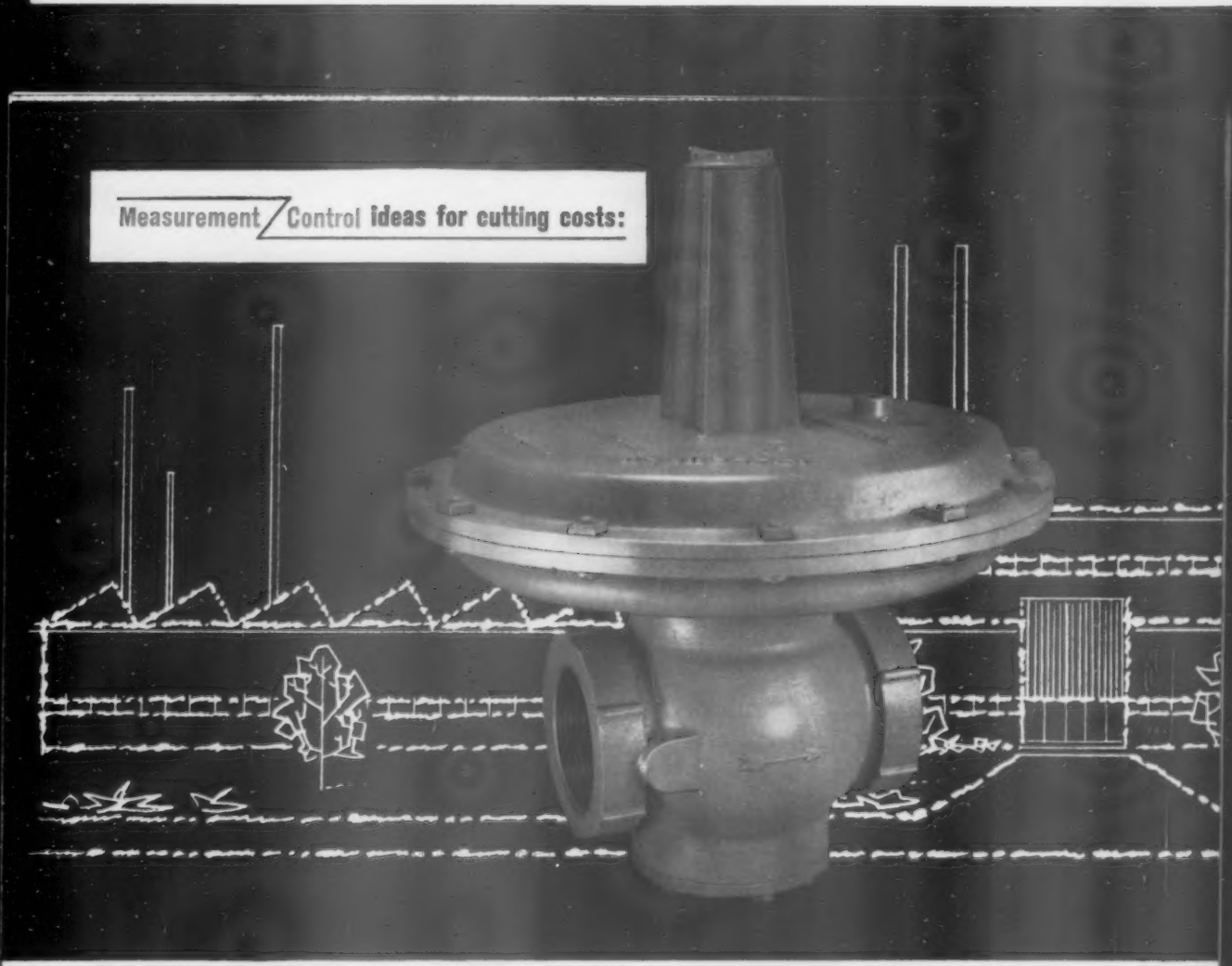


3 for Sylvania Mercury Vapor Lamps

4 for Sylvania Starters

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**



The $40.00 regulator that could have saved $30,000.00

A gas pressure regulator like the one shown above was doing a precise job of regulating fuel gas in a glass plant—until a scaffold fell on it. Without the regulator, the entire plant was out of business. Down-time cost was about $30,000.00.

The Rockwell Field Engineer who personally rushed another regulator to this customer pointed out that an extra stand-by regulator would cost only $40.00—low-cost insurance against a possible $30,000.00 loss. The customer followed this recommendation, as well as others which the Field Engineer made in the interest of more efficient handling of measurement and control functions in this plant.

There are many ways a Rockwell Field Engineer can help *you* save time, money, and material wherever gases or liquids flow through pipe in your plant. He represents the largest and most experienced manufacturer of measurement and control products—and this experience can pay off for you. New or different uses of valves or regulators can prevent waste and inefficiency. Rockwell gas and liquid meters can measure almost anything that flows through a pipe, and can often assure big savings in time and labor, while improving quality.

It costs nothing to talk to a Rockwell Field Engineer—simply send the coupon.

ROCKWELL

The leading single source for Measurement / Control products and ideas

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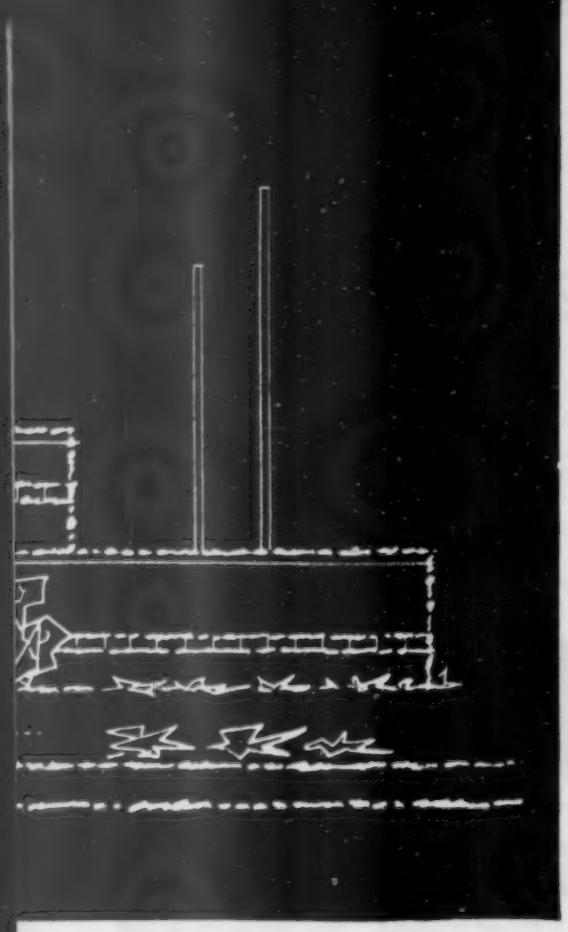
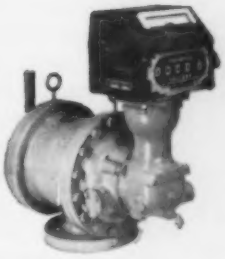


"IN-PLANT" METERING:

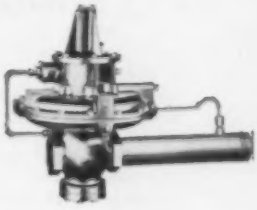
LIQUIDS AND GASES

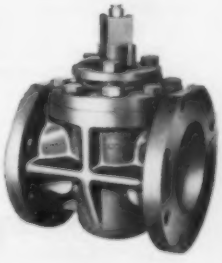


"IN-PLANT" METERING can mean new cost cutting opportunities. Accurate liquid and gas meters are a positive way of improving cost control, insuring better use of materials, sharpening inventory control, and preventing waste. Whatever the need, Rockwell has the right liquid or gas meter to do the job better and at lower cost.

CONTROLLING PIPED MATERIAL:

LIQUIDS AND GASES





CONTROLLING PIPED MATERIAL more efficiently is a positive step towards cost cutting. Better valves can save wasted products and materials and often increase plant safety. Gas pressure regulators can cut costs by assuring safe, economical use of any gas used in the plant. Rockwell has the world's most complete line of flow control devices.

HOW MUCH COULD YOU SAVE?

There is hardly a plant of any kind—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved. It will cost you nothing to have a Rockwell Field Engineer *show* you. Simply send the coupon below, now.

SEND COUPON NOW!

MEASUREMENT & CONTROL DEVICES

another fine product by

ROCKWELL

Rockwell Manufacturing Company, Pittsburgh 8, Pa. Dept. MC1D

☐ Please have a Rockwell Field Engineer call me for an appointment.

Please send literature on ☐ Controlling gas pressures; ☐ Valving gases, liquids and slurries; ☐ Measuring liquids; ☐ Measuring gases.

I am concerned primarily with ☐ Light & Heavy Metal Fabricating ☐ Basic Chemical Production ☐ Chemical Processing ☐ Food, Drugs & Tobacco ☐ General Manufacturing Operations ☐ Petroleum Processing

☐ Others: _____

Name: _____ Title: _____

Company: _____

Address: _____

City: _____ Zone: _____ State: _____

This man

is stopping a robbery-

...With Koppers New Inhibitive Primer

The robbery he's stopping is *undercutting* for which American industry pays millions in recoating and maintenance costs each year. He's stopping this robbery with Koppers' *new* Bitumastic 11S inhibitive primer, the primer that *ends* undercutting problems.

Bitumastic 11S forms a tight, tough bond with the surface to be protected, preventing the spread of corrosion in the event of damage to the exterior protective coating system. Designed for application in severely contaminated industrial and marine atmospheres, this new inhibitive primer also protects cleaned surfaces from "fall-out" before final coatings are applied. Bitumastic 11S solves another difficult coating problem, by thoroughly protecting structural edges and corners where top coatings are extremely vulnerable to damage. A solvent-type primer, Bitumastic 11S is simply applied by brush, and is compatible with almost all types of top coatings.

Two other New Coatings from Koppers Research

Bituplastic No. 33, a new coal tar polymer emulsion coating, is exceptionally resistant to water absorption and offers good adhesion to most substrates. Ideally suited for extreme exposures to heavy industrial atmosphere, Bituplastic No. 33 will not flow or sag at temperatures up to 400 degrees F. This new product gives excellent protection to structural steels, concrete, and other materials subject to attack by corrosive salts and chemical environments. It is applied easily by brush, roller or spray.

Bituplastic No. 44, a mastic coating of troweling consistency, serves as an excellent adhesive and is ideally suited for such uses as adhering cellular glass insulating blocks to the exterior of storage tanks. Bituplastic No. 44 also offers unusual resistance to water absorption, heat and chemical fumes. Another member of the coal tar polymer emulsion coating group, Bituplastic No. 44 is also available on request in a fibrated form, designated as Bituplastic 3S.

Let these New Koppers Coatings work for you

A Koppers specialist will show you how to use these coatings in solving your industrial or marine corrosion problems. From the well-known family of Bitumastic coatings, he'll choose the coating designed for your application. For more information on these new coatings or on our standard coatings, fill out the coupon or write: Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa. District Offices: Boston, Chicago, New York, Los Angeles, Pittsburgh and Woodward (Birmingham) Ala. In Canada: Koppers Products, Ltd., Toronto.

SEE OUR CATALOG IN SWEET'S ARCHITECTURAL FILE OR WRITE FOR COPY

KOPPERS

KOPPERS
BITUMASTIC
COATINGS & ENAMELS
...another fine product of COAL TAR

Koppers Company, Inc., Tar Products Division
Dept. 135D, Pittsburgh 19, Pa.

Gentlemen:

Please send me more information on the Bitumastic Protective Coatings line for corrosion prevention.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

For more facts Circle 403 on Reader Service Card

The big blaze leveled both plant and warehouse
. . . nearly a 100% loss of stock! And then . . .

Along came Jones

Tuesday morning—I was just starting off on my calls when the bad news came over the radio:

Fire—a big one—was burning the Niagara Transformer Corporation to the ground! Niagara makes transformers in Buffalo.

Niagara is also my customer. I'm Bud Jones—salesman for Rome Cable.

My first reaction: get over there . . . quick! But when I arrived the damage had already been done. There was nothing to do but wait . . .

Tuesday evening—the details were in the paper. In less than two hours, fire had completely destroyed both plant and warehouse. 24,000 square feet of space were lost, nearly 100% of stock.

Wednesday morning—just 24 hours later—Niagara had selected an existing building, signed the lease, and started planning the layout. That's where I came in.

Thursday noon—I got the word. They needed wire and cable for an emergency installation, needed it fast. Niagara's new building had *no* power whatsoever. "Can Rome handle *all* the power requirements?" I was asked. "You bet!"

Thursday, 2:15 P.M.—I relayed the order back to our plant at Rome, N. Y. Voltage requirements. Cable size. Distance to be covered.

Part of the order could be made up from stock. But a special power cable—that had to be strung overhead in the new plant, out the skylight, across the roof, through another skylight and down to the transformer—had to be self-supporting and specially made.

Our engineers came up with a quick—and unique—answer. They had three conductors spiralled around a high-strength messenger. That was done in the Rome plant to save Niagara time on the job.

Thursday, 3:30 P.M.—order completed!

Friday morning—after testing—it was shipped.

Just seven days after the fire, Niagara was on its feet again, winding coils for transformers with Rome magnet wire, which we also supplied in a jiffy!

As Herman E. Gabel, Jr., General Manager at Niagara, said: "Rome did a wonderful job in getting us the cable we needed . . . but that's not startling for Rome! We've felt we could always depend on Rome for quick delivery and imaginative engineering."

ALCOA
ROME CABLE DIVISION

Bud Jones' action typifies the type of service you can rely on from your Rome Cable representative. He links you directly and quickly with the facilities and engineering skill at Rome—not only during emergencies but every time you have a wire and cable requirement. When you need help, call your Rome salesman!

ROME CABLE
DIVISION OF **ALCOA**

For more facts Circle 404 on Reader Service Card

MODERN MAINTENANCE

IS PROFITABLE MAINTENANCE

R. L. Kirkpatrick, *Manager, Maintenance Sales,* Westinghouse Electric Corporation

For Production Reliability . . . Don't Just Repair, Modernize

A good maintenance program contributes to a profit by preventing down time, dislocated schedules, spoilage—in short, production losses. Management must recognize these facts and establish a sound modern maintenance program.

The day of wishful fixing or patching of equipment is over. Maintenance and Production management must carefully analyze the present and future demands on all production equipment. Performance records are essential. The ever-increasing use of automatic controls and devices demands greater reliability of all elements in the production process. Failure anywhere along the line will cause down time costing from $5 to $1000 or more per minute. No plant can afford production interruptions on this scale, especially if recurrent—and unnecessary.

Sound maintenance practices demand that equipment be modernized for maximum reliability for the service it is to perform—not just repaired. As an example, motors today are rebuilt, uprated—to improve per-

Here's how Westinghouse maintenance

Precision planning saves customer $25,600

Like a checker game against "time," a 13,000-hp synchronous motor rotor was to be changed out with the fewest possible moves. One hour of unplanned hot mill outage would cost $3200 in lost production directly . . . and cold mill shutdown upon depletion of hot strip reserve.

A scale model of the motor-generator set was built by Westinghouse Field Service Engineers —every move, clearance and individual responsibility were programmed. At zero hour, equipment was tripped off line, rotor removed, the new one installed, bearings fitted, the entire assembly realigned . . . no delays, no accidents. Most importantly, the entire job was accomplished 8 hours ahead of the 96-hour scheduled shutdown, providing the customer with an extra $25,600 of production.

Had the three-quarter million-dollar M-G set been damaged in removal of this rotor, prolonged and expensive down time would have resulted. Precision planning was essential to circumvent clearances of no more than an inch or two.

Super Coilife insulation withstands severe chemical attack

The 40-hp drip-proof motors driving hydraulic pumps used to test jet airliners before flight failed after two weeks in service. Hydraulic fluid had proved too much for a conventional insulation system—a chemical reaction from splash and fumes caused motor failure.

Preparatory to repair, the Westinghouse Seattle Repair Plant tested Super COILIFE* insulation in the hydraulic fluid. Based on complete success of tests, the motors were rewound. Three months after being placed back in service, these newly protected motors are performing smoothly. Westinghouse exclusive Super Coilife is giving positive protection from this chemical attack.

*Trade-Mark

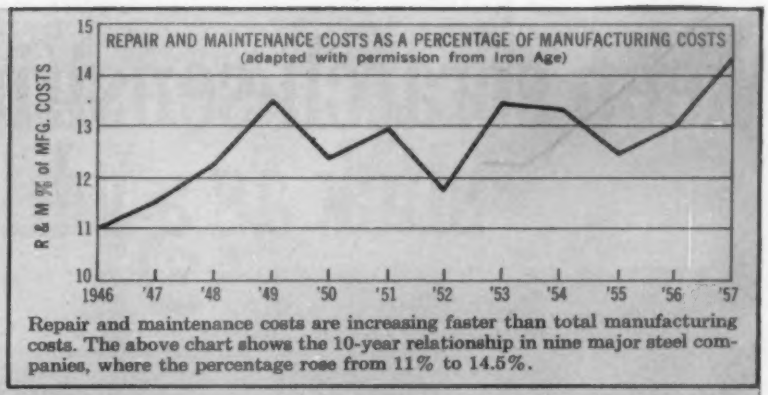
The motor with at least nine lives

Here is a motor that has been periodically drowned . . . but, thanks to Super Coilife, will have a long, useful life. This 50-hp unit drives the main pump for the plant's steam supply. The company's

"Hello, Westinghouse? We've got a problem."

formance, to lengthen useful life, to meet present and future demands. Newly developed insulations with higher thermal characteristics can be used in rewinding motors to meet experienced or expected higher operating temperatures. Mechanical changes to meet the improved electrical operation can and must be made at the same time. When equipment is out of service for repair, these steps may be taken at a minimum additional cost, and provide rebuilt equipment that will last and last. This is modernization that prevents recurrent and unnecessary failures.

Developments in modern product and component design can fortify your present equipment in many ways. Encapsulation of windings, for instance, will provide positive protection against airborne chemicals, moisture or dust. Complete engineering analysis of a dismantled motor will reveal how new and improved materials and processes can give you back a motor that will be better than when it was new.



Repair and maintenance costs are increasing faster than total manufacturing costs. The above chart shows the 10-year relationship in nine major steel companies, where the percentage rose from 11% to 14.5%.

Just as a preventive maintenance program plans repair work into production schedules, so, too, modernization of equipment should be planned into repair schedules. Make-shift maintenance won't do. Modernize capital equipment so that it will do what it is required to do . . . to produce and keep producing profitably.

This is one of a series of Westinghouse articles on profitable maintenance practices.

service assures lower over-all costs

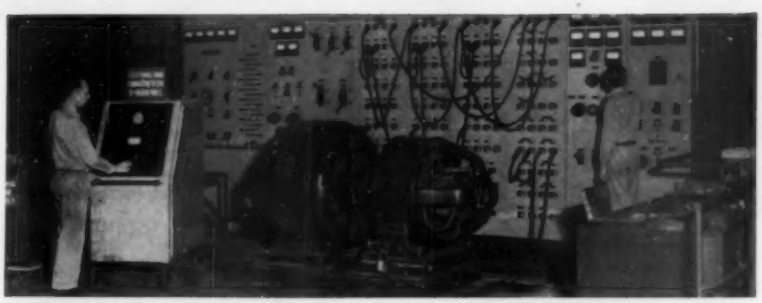
riverside site is subject to basement floods . . . complete immersion of the motor caused original failure.

The Westinghouse Bridgeport Repair Plant rewound the stator with Super Coilife. After one month back on the job, the motor was once again found submerged. Water was pumped away and the motor was started immediately. Four months later it's still running . . . and future reliable operation is assured with Super Coilife.

Pulp mill motors uprated from 450 to 650 hp: fortified with Thermalastic insulation

An Alaskan plant now boasts three motors that in power and overload capacity are better than when new. Increased production demands were overloading these 450-hp drive motors. Measurements showed that temperature rises were reaching dangerous levels.

Westinghouse proposed complete redesign of coils and the rebuilding of all motors on an emergency — but planned — basis. Westinghouse delivered the first unit, a rewound and uprated stand-by stator, for substitution in the first motor. The planned shutdown was met; not an hour's production was lost. The exclusive Westinghouse Thermalastic® insulation process was used and forced ventilating coolers were installed. This electrical and mechanical modernization uprated these motors 44%.



A comprehensively equipped test board in a typical Westinghouse Repair Plant. Final electrical and running tests on rebuilt rotating equipment are made with this special facility.

Three Westinghouse work-together maintenance services are close by and ready to assist you in the repair and modernization of your equipment. In any industrial area of the country, you will find Westinghouse Repair Plants, Renewal Parts Warehouses and Field Service Engineering offices. Westinghouse Maintenance services are available to you on an around-the-clock basis.

In the modernization and rebuilding of your equipment, Westinghouse gives you the very latest materials, components and techniques . . . and a new equipment guarantee. Get in touch with your Westinghouse representative for skilled help in analyzing your maintenance problems. He can show you why it is profitable to modernize. J-95211

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS

For more facts Circle 405 on Reader Service Card

NOW—Polyken surface protection tapes

keep scratch-sensitive surfaces slick as a whistle

In fabricating stainless steel tanks, this Midwestern manufacturer uses Polyken to guard surfaces—"because of its greater resistance to impact and abrasion, plus its specially formulated and controlled adhesive system."

Polyken's shock-absorbing cloth-back tape delivers tough but cleanly removed protection

When one scratch is too many, rule out the risk with Polyken.

Cover those highly finished surfaces with this wide-width, cloth-backed, protective tape. It provides tough resistance to impact and abrasion. Stainless steel, polished aluminum, acrylics or other finely finished plastics—they all come through without a scratch. And Polyken tape leaves the surface clear, clean—slick as a whistle.

Why worry when your surface protection problems can be solved at such a nominal cost.

Find Your Nearest Distributor In The Yellow Pages

Polyken®

INDUSTRIAL TAPES

THE KENDALL COMPANY
Polyken Sales Division

For more facts Circle 406 on Reader Service Card

Just 24 minutes with this movie can save hundreds of man-hours in your plant

If you're concerned with cost control, don't miss Texaco's movie about grease, called "Shear Magic."

There's no hard sell in "Shear Magic." It's devoted entirely to helpful information on ways to cut the cost of maintenance and prevent unscheduled downtime.

A well-planned grease schedule can extend equipment life and cut repair costs and you can bring this message home to your maintenance men by having them see "Shear Magic." This movie suggests ideas for planning the grease schedule that best fits your operation. And it reminds the men that properly choosing and applying greases helps their company, because it assures tighter control of maintenance costs.

A Texaco Lubrication Engineer will be glad to arrange a showing of this full-color film in your plant. Or, if you wish, send for the informative Texaco booklet called *A Grease Schedule for Cost Control*. For quick action, mail the coupon today.

TEXACO

Texaco Inc.
Dept. F-D-31
135 East 42nd Street
New York 17, N. Y.

☐ Please send me more information about a free showing of "Shear Magic" to my organization.

☐ Please send me a copy of *A Grease Schedule for Cost Control.*

Name_____

Company_____

Address_____

City_____ State_____

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

DOW | WEED AND GRASS KILLERS

WEEDS ARE A HAZARD YOU CAN'T AFFORD!

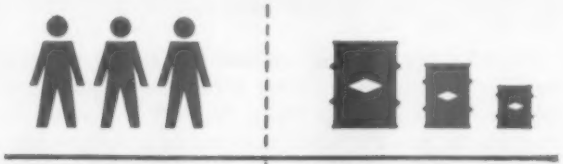
Get rid of the danger chemically with low-cost GARLON

Tinder-dry weeds clustered around a tank car full of flammables. That's an expensive target for a carelessly flipped, burning cigarette. And when the raging blaze follows, all the modern fire prevention measures inside the plant won't keep the flames out.

Garlon*, a modern chemical killer, knocks out dangerous weed and grass problems the low-cost way. Spray the actively growing foliage, and Garlon goes to work systemically—kills the whole weed or grass plant—roots and all! And you can use Garlon at your convenience *any time* during the growing season.

Simple to use, Garlon needs only to be mixed well with the recommended amount of water, and it's ready for spraying. Your crews can readily do the job—or a professional spray contractor will do it for you.

For all troublesome areas — sidings, docks, fences, ditches, parking lots, outdoor storage areas—the use of Garlon minimizes labor, immediately cuts your weed and grass control costs. Best of all, it cuts them *more each year,* because fewer spray applications are required.



Hand-cutting costs stay constant from year to year

Chemical maintenance costs actually diminish each year

Learn more about how modern chemical vegetation control can save money for your company. Write THE DOW CHEMICAL COMPANY, Agricultural Chemicals Sales, Dept. 209LO4, Midland, Michigan.

*TRADEMARK

See "The Dow Hour of Great Mysteries" on NBC-TV

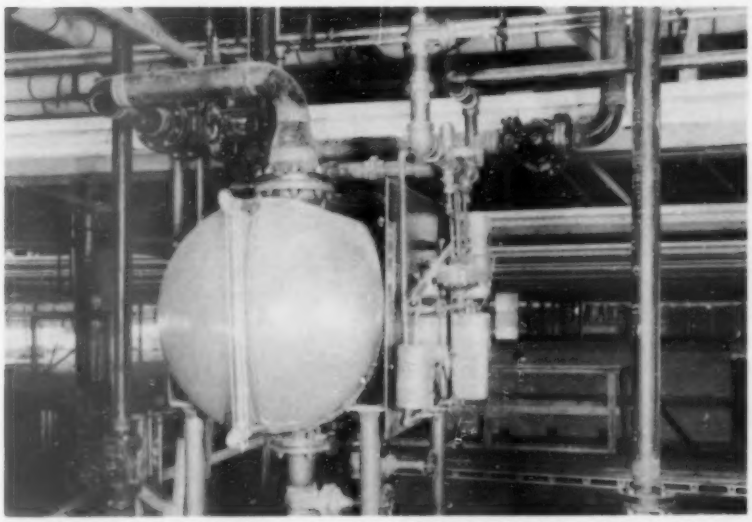
THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

For more facts Circle 408 on Reader Service Card

For more facts Circle 409 on Reader Service Card ➤

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company



One of two batteries of condensate pumps installed in each of five similar buildings at General Electric Appliance Park, Louisville, Ky. To protect against damage from steam condensate corrosion, Wrought Iron Pipe has been installed for the return lines within each building and to the area's central boiler plant.

Seven Ways to Minimize Maintenance In Steam Condensate Systems

While selection of the right piping material precludes virtually all other factors in controlling condensate corrosion, additional service life can be squeezed from your existing system by following these helpful suggestions:

1. The feed water deaerator should be operated at or near boiling point, and should be maintained in an efficient condition.
2. All joints in return lines operating under sub-atmospheric pressures should be made airtight.
3. All horizontal return lines should be given sufficient slope or pitch to permit rapid and complete drainage.
4. All low points or pockets in the lines where condensate can collect should be eliminated or properly tapped.
5. Reaming of pipe ends to remove burrs is particularly important in condensate lines.
6. Cold water injection into return lines ahead of vacuum pumps should be avoided wherever possible.
7. Extra heavy nipples should be used in return lines.

Practically any application where steam condensate is conveyed through pipe is a "natural" 4-D Wrought Iron application. Here are two reasons why:

1. Ordinary metals corrode quickly and become costly maintenance headaches. Alloy steels increase initial costs greatly.
2. 4-D Wrought Iron's corrosion-blocking film forms around the interior wall of the condensate line enabling the pipe to give long, maintenance-free service.

Incidentally, since the right piping material means so much to service life in steam condensate systems, you may wish to contact our Engineering Service Department staff. They maintain records and data spanning 60 to 75 years which show how long various materials endure in steam condensate service.

How D. L. Clark Co. Cuts Maintenance Costs 50%

"Because of the excellent service life of 4-D Wrought Iron Pipe in the plant, fewer pipe fitters and helpers are needed," says the mechanical superintendent at the D. L. Clark Company, Pittsburgh, Pa.

Here, at the home of the famous Clark candy bar, 4-D Wrought Iron Pipe, one-half inch to six-inch sizes, and 4-D Wrought Iron nipples are kept in stock. This pipe material is used for steam lines, condensate return lines, air lines, hot and cold water lines, and chocolate lines.

Mr. Robert Dunbar, the plant's mechanical superintendent, credits 4-D Wrought Iron with cutting maintenance costs approximately 50 per cent in his operation.

4-D Wrought Iron proves especially effective at the Clark Company against that old bugaboo, condensate corrosion. Let's review the nature of this nemesis for a minute. After steam loses its heat, it turns to moisture, which is distilled water greedy for gases. Any gas in the steam is readily absorbed into the condensate as it is cooled. The condensate becomes violently corrosive, depending upon the percentage of free CO_2 plus O_2 contained in the steam. Becomes downright costly, too, if allowed to rampage. 4-D Wrought Iron doesn't let it.

A Forging Tip or Two

In order to forge 4-D Wrought Iron successfully, it is necessary to heat it to at least 2300°F., and stop working it when it reaches a temperature of 1750° to 1800°F. At 2300°F., 4-D Wrought Iron gives a greasy heat. From 2500° to 2600°F., it will sweat.

Higher temperatures are essential in forging 4-D Wrought Iron because of its low carbon content. 4-D Wrought Iron with its low carbon content will take much more heat without burning than other materials with higher carbon. At the right temperatures, 4-D Wrought Iron is a cinch to work and form.

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company

How to Dry Sand With No Piping Downtime

Norton Company, Worcester, Mass., has a tough assignment for heat exchanger tubes: in a sand drier that removes moisture from the abrasive materials used in grinding wheels, refractories, laboratory ware, non-slip tile, and other products. The tubes, which carry steam or hot water, are housed in a rotating shell filled with the sand.

Tubes in this service are subject to the punishing corrosive action of the moisture in the sand as well as the abrasion of the sand as it rushes over the coils. The inside walls of the tubes are also subject to corrosive action because of the condensate they carry.

Water or moisture in the sand usually has a chloride content. And 4-D Wrought Iron's proven resistance to salt and brine effects provides an excellent basis for comparison in this service.

If corrosion or abrasion is playing hob with your piping coils, it could be you're using an inadequate piping material. Maybe it's time you investigated the advantages of 4-D Wrought Iron.

Right Pipe, Wrong Nipples, Premature Failure

In a steam condensate line installation in North Carolina, specifications called for wrought iron pipe to be used. Steel nipples, however, were selected for this corrosive service.

Within three years, the steel nipples began to fail. They were replaced with wrought iron nipples, and the steam condensate line has experienced no trouble since. Therein lies an object lesson.

4-D Wrought Iron nipples, preferably extra strong, should always be used in *any* piping system because the majority of failures occur at joints which should really have *extra* protection.

Identification is important, too. Here's how to be sure you get what you order. Byers 4-D Wrought Iron nipples, other than close nipples, are machine stamped with the word BYERS and STD for standard weight, or X STG for extra strong pipe. Close nipples bear a red band around the center. Couplings up to and including 14" are stamped with a "B" within a keystone. If you want durability—all the way down the line—insist on 4-D Wrought Iron nipples.

WHAT IS "4-D"?

Note: New 4-D Wrought Iron was achieved by substantially increasing the deoxidation of the base metal, slightly increasing the phosphorous content, and using a more siliceous iron silicate. Result is increased corrosion resistance, improved mechanical and physical properties.

Literature Available

Literature described below is available on request. For information on specific applications, write Byers Engineering Service Department.

New four-color booklet, **4-D Wrought Iron: A New Dimension in Corrosion Control,** discusses in detail Byers' latest product development. Includes a test section which is graphically illustrated and shows comparative corrosion resistance of 4-D Wrought Iron, standard wrought iron and other ferrous metals.

Information on facts affecting corrosion, comparative service records, and suggestions for minimizing maintenance are presented in our special report: **The Use of Wrought Iron in Steam Condensate Lines.**

Complete mechanical data on all Byers pipe and tubular products are available in the **Byers Pipe Catalog.** Discusses differences between 4-D Wrought Iron and steel. Includes specifications, pipe standards and measurements.

New ten-page bulletin, **Cold Drawn Wrought Iron Heat Exchanger and Condenser Tubes,** cites actual installations in which the use of 4-D Wrought Iron and other metal tubing in the same equipment permits service life comparisons. Lists cost-per-foot-per-year figures for each material and the corrosive conditions present.

For additional information on 4-D Wrought Iron, contact Byers Division Offices in the cities listed below.

The maintenance and operating items appearing in BYERS GUIDE #1 were prepared by the Engineering Service Department of

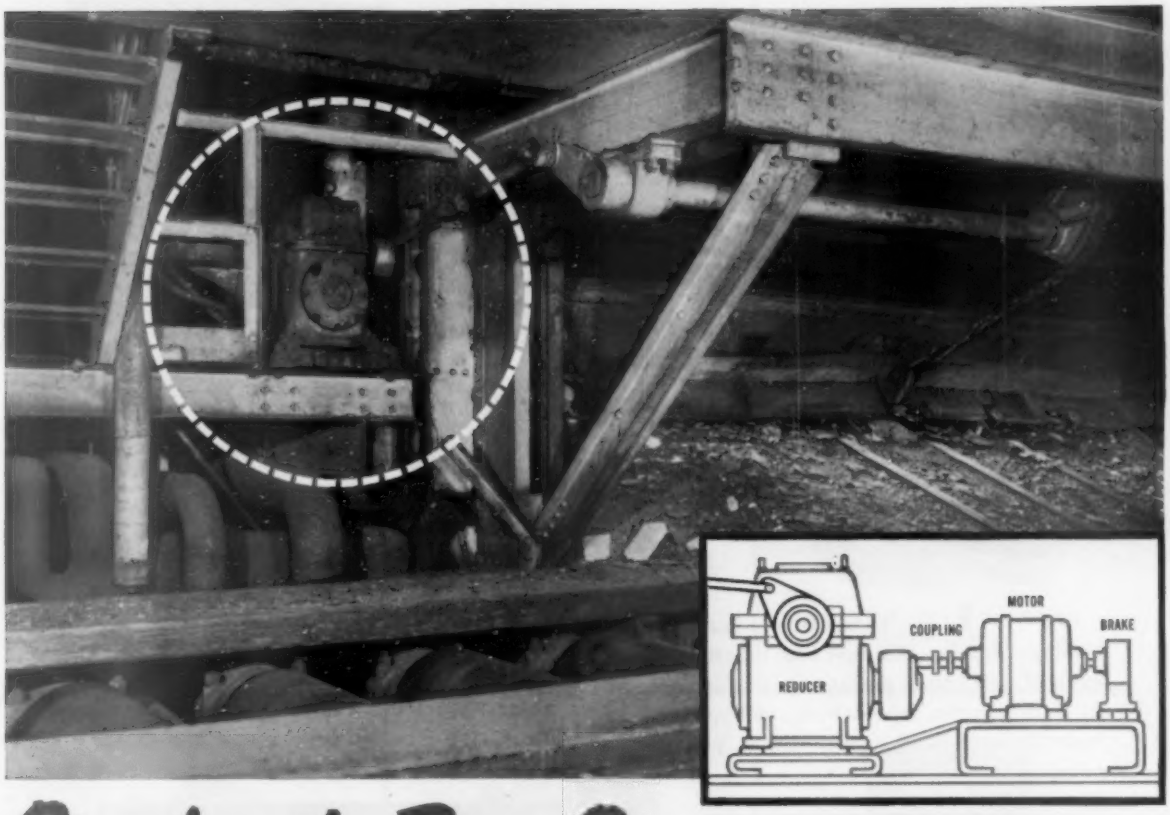
A. M. BYERS COMPANY

Pittsburgh 22, Pennsylvania

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA
PITTSBURGH • ST. LOUIS • SAN FRANCISCO • WASHINGTON, D. C.

4-D Wrought Iron is immediately available and may be obtained through established distributors of Wrought Iron Pipe. Plate, bar, and other flat rolled products may be ordered direct.

Corrosion costs you more than Wrought Iron



Opening the Door On TOMORROW

Every time this Foote Bros. Worm Gear Reducer operates, "tomorrow" . . . and the promise it brings of better living for more people, comes a little closer.

Installed in the modern 44″ Hot Strip Mill at Inland Steel Company's Indiana Harbor plant, this Reducer opens one of two discharge doors on the No. 4 Reheat Furnace to begin the process of converting red hot slabs into coils of sheet steel which will be used by Inland's customers to produce better products for better living for more people. Another Foote Bros. drive is used to open the other door.

Steelmaking calls for rugged, dependable equipment and Foote Bros. Reducers meet these requirements in every respect. Precision generated gearing, heavy duty shafts and high capacity bearings are all designed to provide the kind of trouble-free service required in today's high speed steelmaking operations. Maintenance men have no trouble with the many Foote Bros. Drives at work in the Inland plant because these drives are built for "no downtime" service.

There's a Foote Bros. Drive for your power transmission requirements. Ask your nearby Foote Bros. Authorized Distributor for information or assistance concerning your power transmission problems. He's ready to help you.

FOOTE BROS. F B **GEAR AND MACHINE CORPORATION**

4585 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES

DODGE HAS MORE PROVED BEARINGS THAN YOU HAVE BEARING PROBLEMS!

It pays to buy from a line of stock bearings—bearings that have been proved in thousands of installations similar to yours. You benefit by getting known dependability; and you get the important savings of high quality at production price.

PIN-POINT SELECTIVITY

Dodge has supplied mounted bearings to industry for over three-quarters of a century. Dodge bearings have always kept pace with improved production practices. Each new condition of service has been met by Dodge as it has arisen, with the result that the Dodge line contains mounted bearings to meet almost every service requirement with pin-point accuracy.

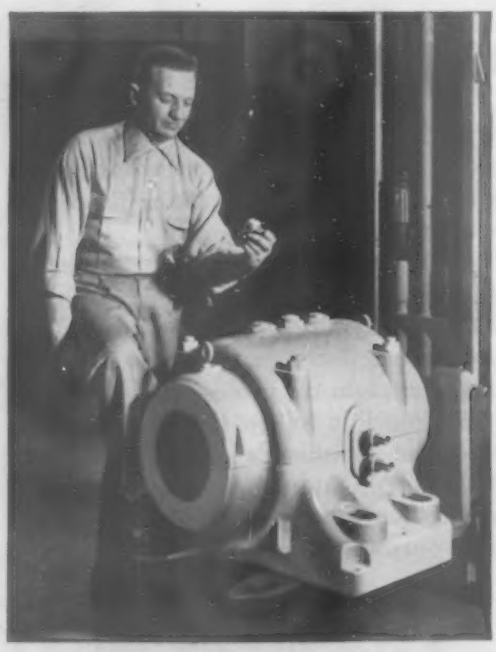
High load, high speed, excessive dust, moisture, corrosion, high or low temperatures, continuous operation—you name it!—such conditions and their combinations are met every day with Dodge bearings.

BROAD LINE—WIDELY DISTRIBUTED

In the great variety of mounted bearings developed by Dodge, you will most likely find the precise unit to fit your requirements ideally—without paying for features you do not need. And if your requirements call for several types of bearings, there is an advantage in having them of common design, such as Dodge offers.

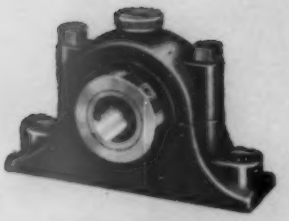
The Dodge line is probably broader than any other line of mounted bearings in America. And of special importance to machinery manufacturers, it is the most widely distributed line. There is always a Dodge bearing of the right type and size near at hand.

You can check this with your local Dodge Distributor. Ask him—or write us for the Dodge Bearing Bulletin.

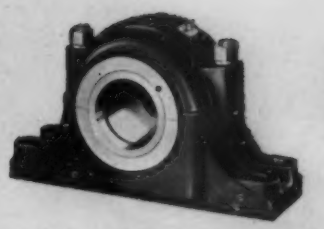


In addition to tapered roller, spherical roller and ball bearings, Dodge builds many types of sleeve bearings. Here is the "large and small" of the sleeve type bearings carried in stock—ranging from an 8-in. Sleevoil weighing over 1200 lbs. to a ½-in. solid journal bearing weighing 9 ounces.

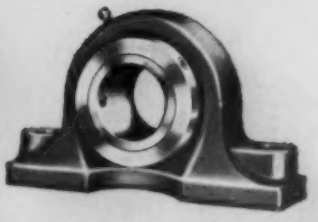
DODGE MANUFACTURING CORPORATION, 400 Union Street, Mishawaka, Indiana



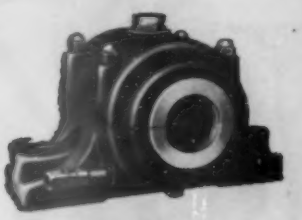
DODGE PILLOW BLOCKS WITH TIMKEN TAPERED ROLLER BEARINGS



DODGE SPHER-ALIGN PILLOW BLOCKS WITH SPHERICAL ROLLER BEARINGS

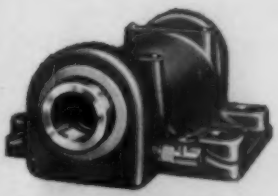


DODGE BALL BEARING PILLOW BLOCKS

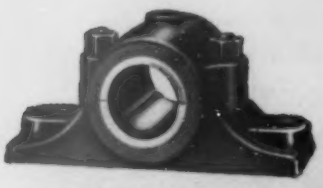


DODGE SLEEVOIL PILLOW BLOCKS

DODGE BRONZOIL PILLOW BLOCKS

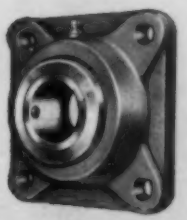


DODGE BRONZE BUSHED PILLOW BLOCKS



DODGE JOURNAL BEARINGS SOLID AND SPLIT

DODGE HEAVY RIGID PILLOW BLOCKS



FLANGE BEARINGS: HANGER BEARINGS: BEARING UNITS: TAKE-UPS

● **Dodge Pillow Blocks with Timken Tapered Roller Bearings.** America's quality pillow blocks. Assembled, lubricated, adjusted and sealed at the factory. 5 types for varying needs.

● **Dodge Spher-Align with Spherical Roller Bearings.** Rugged heavy duty, compact, inherently self-aligning. Exclusive Micro-Mount simplifies installation.

● **Dodge Ball Bearing Pillow Blocks.** Deep groove ball bearings with long inner races—high capacity. SL, SC and SCM models for light, normal and medium service respectively.

● **Dodge Sleevoil Pillow Blocks.** Ultra quality . . . extra long life . . . accessibility . . . *quiet*. Plain or water-cooled.

● **Dodge Bronzoil Pillow Blocks.** Efficient, low cost pillow blocks with self-oiling, capillary bronze bushings. Self-aligning. Large oil reservoirs.

● **Dodge Bronze Bushed Pillow Blocks.** Quiet fan and blower pillow blocks with two bronze bushings of high lead content mounted in one cast iron housing.

● **Dodge Journal Bearings — Solid and Split.** True running, dependable. Babbitted bearings with precision machined bores and faces. Finished bases.

● **Dodge Heavy Rigid Pillow Blocks.** Rugged, carefully bored, babbitted pillow blocks for many applications requiring grease lubrication. Finished bases and ends.

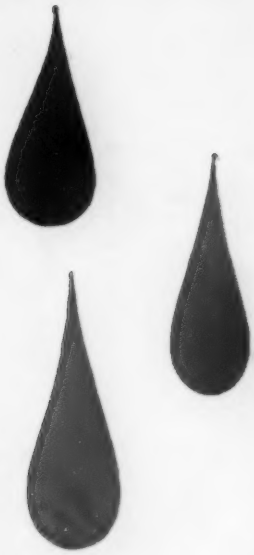
● **Bearing Units.** A wide variety—spherical seat, cartridge, flange, hanger, screw conveyor hanger, take-up. Ball, Roller and Sleeve types.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."

DODGE

of Mishawaka, Ind.

MUCK...



. that didn't cause damage . . .

thanks to CFC Filters

This Honeycomb Filter Tube trapped damaging micro-contaminants *before* they could cause costly injury to machines, processing equipment or products.

CFC Filters reduce maintenance costs, protect valuable equipment, improve product quality . . . by providing continuous micro-clarity for chemicals, gases, oils and water in many and varied operations.

At no obligation, a qualified CFC Filtration Engineer will survey your plant and recommend micro-filtration wherever it will save you money. Write Dept. FA.

Filter out high costs . . . ***with CFC Filters***

CFC

COMMERCIAL FILTERS CORPORATION

Fulflo • Honan-Crane • Delpark • Michiana

MELROSE 76, MASSACHUSETTS

PLANTS IN MELROSE, MASS. AND LEBANON, IND.

For more facts Circle 412 on Reader Service Card

For more facts Circle 413 on Reader Service Card

THE RIGHT THERMOSTAT FOR EVERY PURPOSE

ROOM THERMOSTATS
Single-temperature, dual-temperature (day-night, heating-cooling), and submaster thermostats in a wide selection of models. Proportional or two-position action. Direct or reverse acting. Sensitive bimetallic measuring elements. Wide selection of adjusting features.

HEATING-COOLING THERMOSTATS
Two-pipe room types with two bimetallic measuring elements and concealed types with remote bulb liquid filled measuring elements. Direct acting for heating; reverse acting for cooling. Proportional action. Manual or automatic change-over. Choice of adjusting features.

INSERTION THERMOSTATS
Available with liquid-filled sensitive elements and rod-and-tube type sensitive elements. Rigid stem. Proportional or two-position action. Direct or reverse acting. Adjustable sensitivities. Available with pneumatic follow-up movement (pneumatic feedback) for extreme accuracy at low sensitivities.

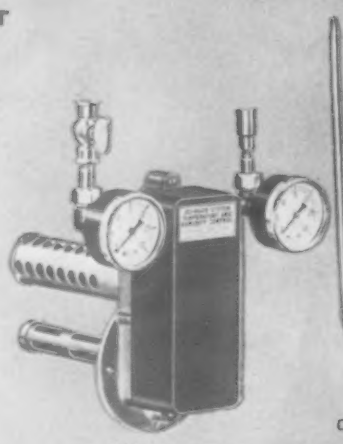
IMMERSION THERMOSTATS
Wide choice of models with same selection of features as Insertion Thermostats.

REMOTE BULB THERMOSTATS
For applications requiring location of thermostat at a distance from the point of temperature measurement. Liquid-filled measuring elements with capillary lengths to 85 ft. Proportional or two-position action. May be converted from direct to reverse acting. Available with follow-up movement (pneumatic feedback) for accurate control at low sensitivities.

SUBMASTER THERMOSTATS
Insertion, immersion and remote-bulb types. Set point may be varied from a remote point by action of another (master) controller. Available with liquid-filled stem and remote-bulb measuring elements. Direct or reverse acting. Proportional or two-position action.

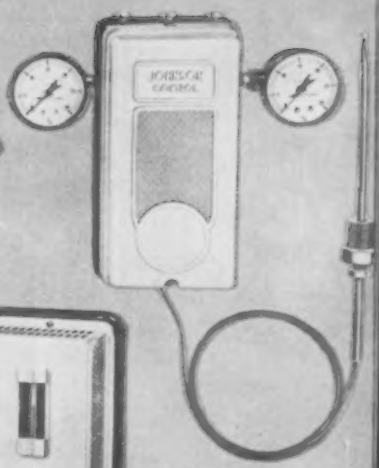
AIRSTREAM THERMOSTATS
Available with flexible 8-ft. liquid-filled averaging element or rod-and-tube type element. Direct acting, proportional action. Adjustable sensitivity. One- and two-pipe models.

COMFOSTATS
An exclusive Johnson instrument that controls from "effective" temperatures, regulating temperature in proportion to changes in relative humidity. Bimetallic temperature measuring elements; choice of humidity elements. Proportional action. Direct or reverse acting. Single- and dual-temperature room types, insertion type, and submaster type models available.

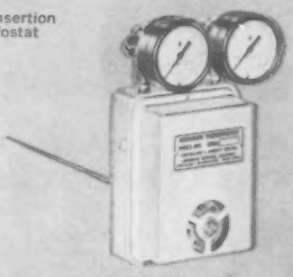

T-409 Insertion Comfostat

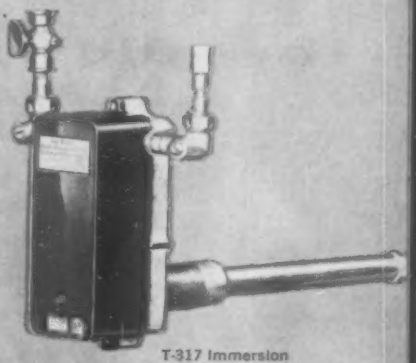
T-271 Heating-Cooling Thermostat

T-411 Submaster Comfostat


T-900 Liquid-Filled-Remote-Bulb Thermostat

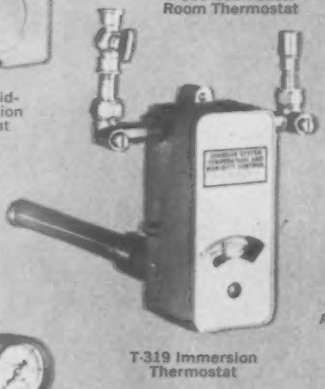
T-408 Room Comfostat


T-802 Liquid-Filled Insertion Thermostat

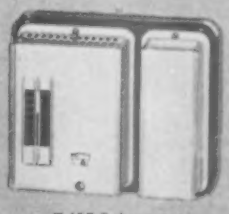

T-317 Immersion Thermostat

T-902 Liquid-Filled Insertion Thermostat

T-315 Submaster Room Thermostat


T-319 Immersion Thermostat

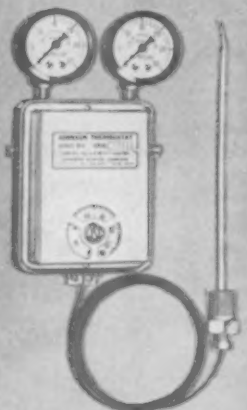
T-335 Submaster Airstream Thermostat

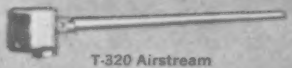

T-435 Submaster Heating-Cooling Thermostat

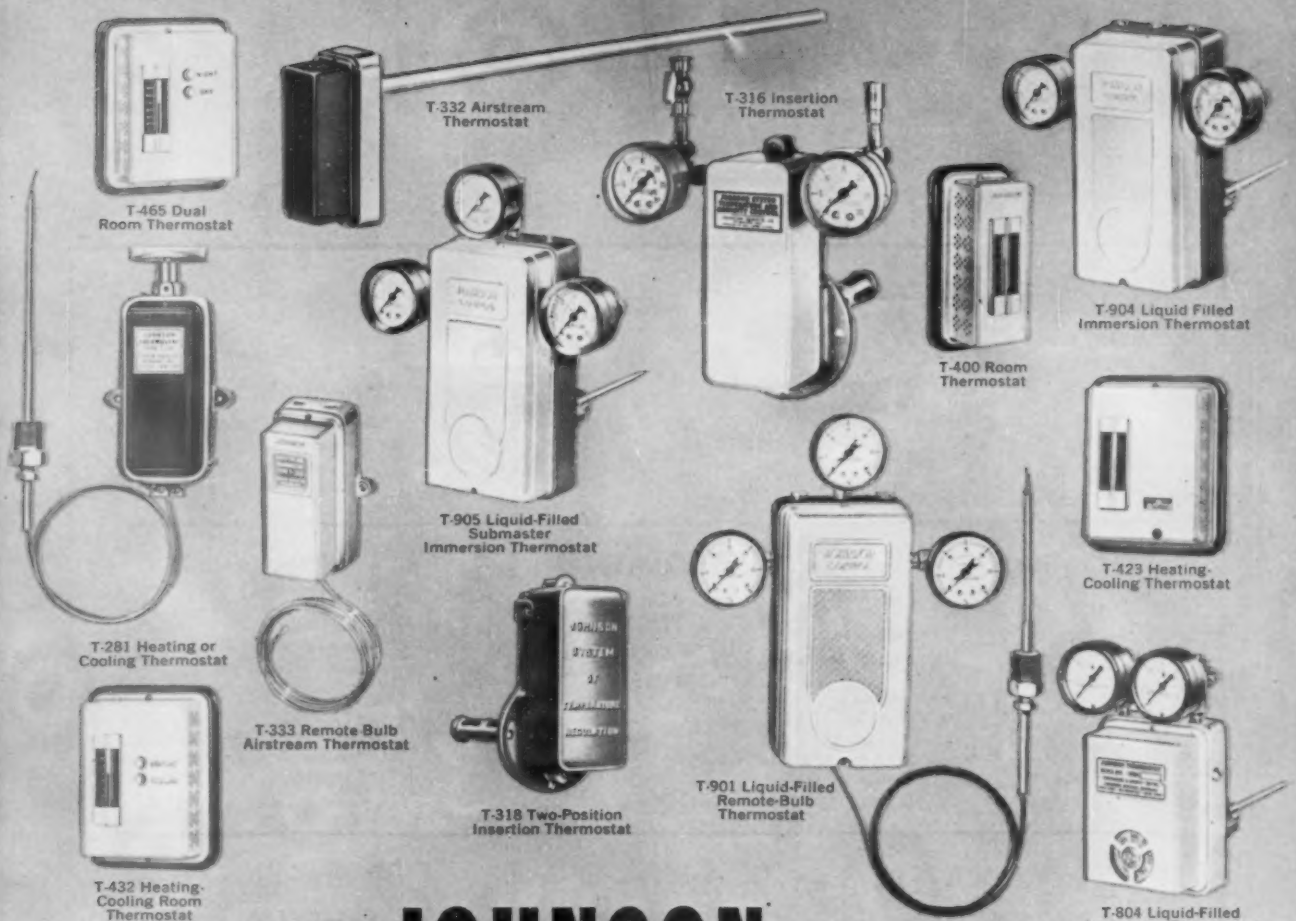
T-903 Liquid-Filled Submaster Insertion Thermostat

T-405 High-Low Room Thermostat

T-418 Dual Room Comfostat


T-800 Liquid-Filled Remote-Bulb Thermostat


T-320 Airstream Thermostat



JOHNSON THERMOSTATS

for Air-Conditioning, Heating, Ventilating, and Process Control

"The right equipment, properly applied" has always been a basic Johnson rule. That's why Johnson makes the most complete line of pneumatic control equipment in the industry, including, of course, a thermostat for every application.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

JOHNSON SERVICE COMPANY
507 East Michigan Street, Milwaukee 1, Wisconsin

- ☐ Have a Johnson engineer call on me.
- ☐ Send your new condensed catalog of all types of Johnson Pneumatic Control equipment.

OUR 75TH YEAR

Name_____

Title_____

Firm_____

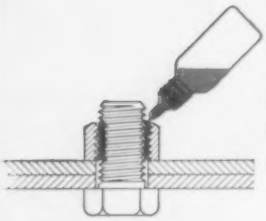
Address_____

City_____ State_____

Stop breakdowns, cut downtime with Loctite, the new liquid lock

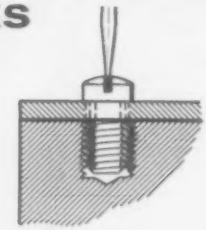
Loctite Sealant stops costly breakdowns due to nuts that work loose . . . repairs loose bearings without expensive shaft or housing preparation . . . seals pipe and tubing joints pressure tight.

LOCKS



Makes any threaded part self-locking

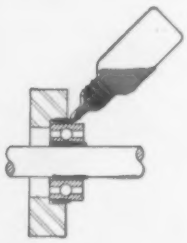
- prevents breakdowns caused by loose bolts, nuts and studs



Simplifies servicing

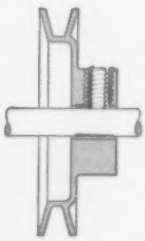
- makes any threaded part vibration-proof yet easy to disassemble with ordinary tools

RETAINS



Makes bearing replacement easy

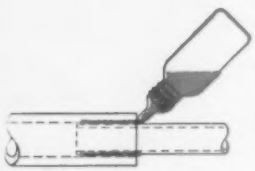
- retains bearings without press fit
- eliminates reboring, sleeves, shims, and weld metal builds



Acts as liquid shim

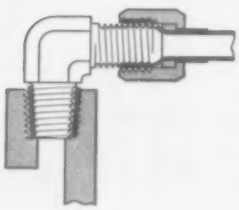
- corrects fitting of a part on a shaft by filling clearance where slippage occurs. Also locks set screws
- can be used to retain pulleys, gears, rollers, drums, hardened sleeves, oil seals

SEALS



Simplifies tube joining

- replaces solder
- requires no heat or corrosive fluxes
- no mixing . . . comes ready to use



Prevents leaks in high-pressure fluid lines

- completely fills joints with tough plastic
- resists heat, cold, fuels, oil, water, solvents, all hydraulic fluids
- contains no solid particles to foul valves

LOCTITE Sealant simplifies repairs . . . minimizes inventory problems

A single drop of Loctite makes any nut a lock nut—any screw a lock screw. Each drop a "Liquid Lock Washer" that fits all sizes. A free-flowing liquid plastic, it wicks into threaded parts and close-fitting metal joints . . . then hardens from the inside out.

Easy-to-apply Loctite comes ready for use. It requires no heating or mixing . . . will not air-dry . . . and stores for years. There are Loctite service kits for all types of maintenance applications.

You can count on your distributor salesman for service that keeps things running. Ask him for information on how to use Loctite to perform maintenance magic.

LOCTITE® SEALANT

BE PREPARED FOR QUICK REPAIRS

ORDER MAINTENANCE KIT NO. 2-50 TODAY

Contains two squeeze bottles of cost-saving Loctite Sealant; applicator nozzles; treats 6000 ¼" nuts; Locquic Cleaner for use on greasy or oily parts (jar has dip basket for small parts); complete directions. Price . . . only $15.95.

American Sealants Company • 391 Woodbine St., Hartford 6, Conn.

For more facts Circle 414 on Reader Service Card

For more facts circle 77 on Reader Service Card→

The alternate to this is . . . DOWNTIME!

An ounce of prevention . . . can eliminate *downtime* in your plant. With today's highly mechanized manufacturing and distribution methods . . . *downtime* of materials handling equipment can mean the difference between a profit or a loss.

A Clark Dealer *Continuous* Maintenance Program, available from 113 Clark dealers across the continent, offers you the most effective, and economical method of reducing costly *downtime*. Here's why!

In brief, a Clark Dealer Continuous Maintenance Program offers you:

1) . . . regular maintenance on your industrial trucks on a *programmed* basis. Scheduling is conveniently set up for your particular operation. If you like, service to your equipment can be done at night or at any other time when your equipment is not in use. The additional cost for this off-shift service is a small percentage of the cost of *downtime*.

2) Clark dealers, with the aid of a national service personnel training program, assure you that the best trained mechanics in the industry will service your equipment. These highly trained specialists perform a minimum of 22 separate inspections on every truck serviced. They not only perform the normal jobs of greasing and oil changes, but also make all necessary adjustments to your equipment. Most important, they report the condition of your machines, anticipating failure before it happens. As a result . . . *downtime* is drastically reduced.

3) A Clark Dealer Continuous Maintenance Program gets you out of the repair and maintenance business. It eliminates the need for special tools, parts stock and use of valuable plant space for servicing facilities.

4) A Clark Dealer Continuous Maintenance Program is economical. It actually costs less than similar service on your own automobile. This is an inadequate comparison, however, when you consider the small cost of preventive type maintenance to the cost of *downtime*.

For detailed information on a Clark C.M. program call your local Clark dealer (he's listed in the Yellow pages) or write: C.M. Service, Clark Equipment Company, Battle Creek, Michigan. No obligation, of course.

CLARK® EQUIPMENT

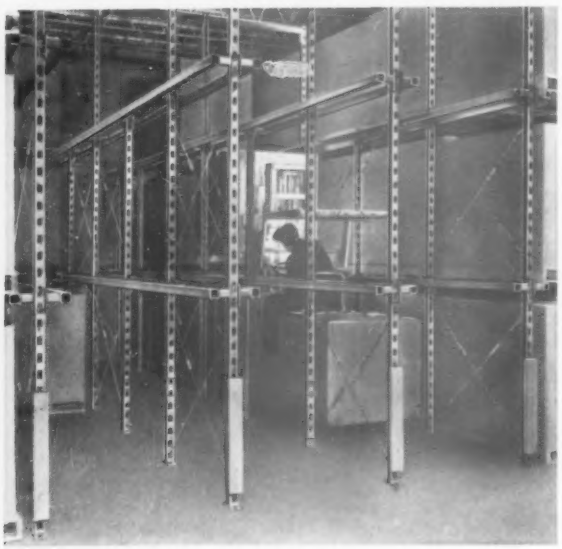
Printed in U. S. A.

American

OPEN-END

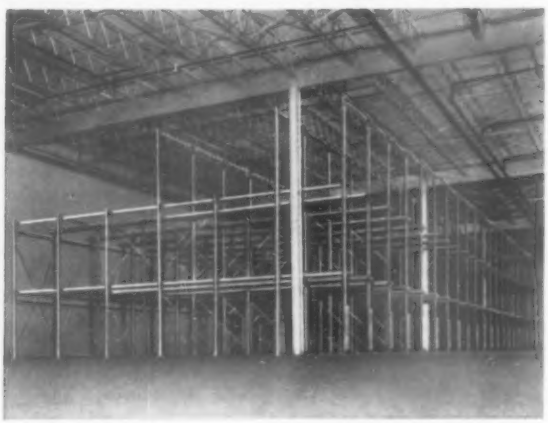
Drive-In or *Drive-Thru*

ADJUSTABLE RACKS

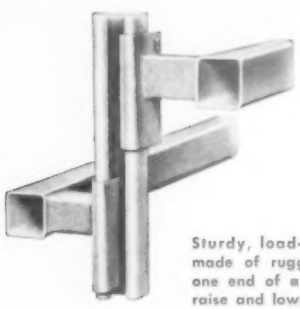


Any fork truck can drive directly into storage area, to load or unload, the American way.

quickly pay for themselves in cutting labor costs and in giving extra storage space



American Open-End Rack installation, Kingsport Press Company, Kingsport, Tennessee.



Sturdy, load-carrying stringers are made of rugged square tubing from one end of a row to the other. They raise and lower like a window, on 4" centers, with the American trigger-quick, slide-n-lock method of assembly.

MOST for the LEAST . . . that's the big story behind American "Drive-In" or "Drive-Thru" storage racks . . . MOST in cube storage and storing efficiency . . . LEAST in labor costs. These solid facts have been proved time and time again. American "Drive-Thru" racks are open at both ends so trucks can travel all the way through for "first-in," "first-out" storage. American "Drive-In" racks, with one end open, are for use against a wall or where "first-in", "first-out" storage is not necessary. American trigger-quick, slide-n-lock stringers mean quick adjustability for speedy load handling. There's a lot more to tell about these rugged, super-efficient American storage racks, so send for all the facts today.

send for literature

AMERICAN METAL PRODUCTS COMPANY

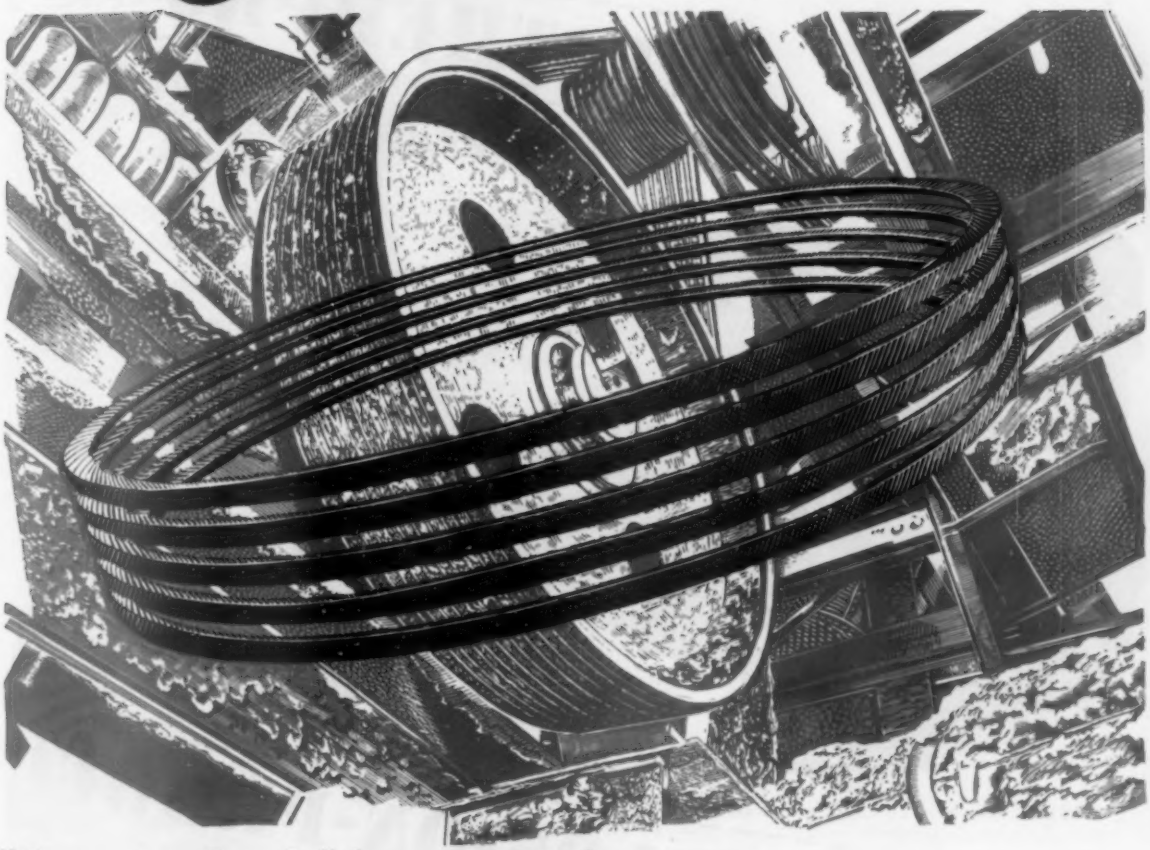
STORAGE RACK DIVISION

5965 Linsdale Ave. amp® **Detroit 4, Michigan**

Manufactured in Canada by Sunshine-Waterloo Co., Ltd., Waterloo, Ontario

For more facts circle 415 on Reader Service Card

U. S. ROYAL V-BELTS from the Power Unlimited complete belt line



"Swinging Loads" demonstrate how

balanced driving power pays off

The flywheels on stone-crushing machinery at the Bethayres Concrete Products Company in Bethayres, Pa., put V-belts under a "tremendous strain."

Not only must each set of 8 U. S. Royal V-Belts driving the flywheel operate under extremes of abrasive conditions, it must also operate on constantly changing centers. As incompressible foreign matter enters the driven rollers, they swing or oscillate to allow passage. The result is constantly changing tensions under pressures amounting to many tons!

Yet even with this constant change in tensions and the severity of the abrasive conditions, the U. S. Royal V-Belts continue to share the load for an average of one year of rock-breaking service.

The C-210's used on these V-sheave to flat-surface drives, like all of the approximately 250 "U. S." belts in 48 different sizes used throughout the Bethayres plant, have a built-in advantage. "Balanced driving power"... the result of specially developed manufacturing equipment that automatically controls weight, dimensions, density, length, and tension members ... helps provide a uniformity, toughness, length stability and true-running smoothness that have paid off in job after job, plant after plant the nation over.

Put balanced driving power to work in your own operations. See your "U. S." Power Transmission Distributor for full stocks and expert service.

U. S. Royal V-Belts and engineering assistance for these drives supplied by "U. S." Distributor Lindsay-Oberholzer of Philadelphia, Pa.

Visit Booth 1324, Design Engineering Show, New York Coliseum, May 23-26.

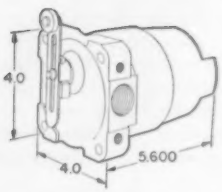
Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

"CX" Precision Switch



"CX" Series Switch
A 20 amp. switch. U/L listed for use in hazardous vapor-air and dust-air atmospheres.

Here's a weatherproof answer for outdoor switch applications and a safe answer in hazardous areas where explosions could occur. All exposed parts of the "CX" are treated to resist corrosion and the cast aluminum housing is sealed against driving rain, dry blowing dust, heat and humidity.

The non-sparking nylon roller actuators and the explosion-proof design make the "CX" safe for areas where dangerous gasoline or lacquer solvent vapors, coal or grain dust collect. The lever arm is adjustable through 360° and from one inch to 3½″ in length.

The "CX" contains two single-pole, double-throw switching units, each operated by opposite movements of the roller arm. You can depend on it for rugged switch jobs with hard mechanical service or heavy electrical loads. Don't take chances with explosion hazards. Write for Data Sheet 156 on the weatherproof, explosion-proof "CX" precision switch or call the nearby MICRO SWITCH branch office listed in the Yellow Pages.

75th HONEYWELL PIONEERING THE FUTURE

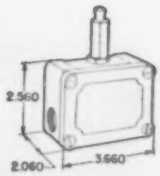
FACTORY

Don't Risk Explosions in Hazardous Areas!

Many different explosion-proof switches are available in the MICRO SWITCH line to help make your plant safer. The nearby branch office or distributor can recommend the right model for performing limit, safety or interlock functions in hazardous areas where dust or vapors might explode. These switches can also cut costs with their automatic control. Be sure of precision and reliability by calling the MICRO SWITCH man. Here are three representative series in the MIRCO SWITCH line of explosion-proof switches:

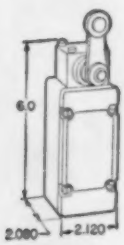
"EX-AR" Series. These are the smallest explosion-proof switches available. They are rated at 15 amperes and have a roller-arm actuator. Operating force is only ½ to 1¼ lb.

"EX-Q" Series. Rated at 15 amperes and small enough for mounting in cramped installations. Explosion-proof in atmospheres where dust or vapors are a problem. Equipped with a plunger actuator that will withstand a steady load of 100 pounds without injury to the enclosed switching unit. Operating force: 3 lbs. max.



EX-Q (above) has same dimensions as EX-AR.

Other "EX" Switches are available with cross-roller lever actuators and manual types. Different operating characteristics and contact arrangements are available to fit varying applications.



"ML-E1" Series. The operating head on these switches is specially sealed against dust and abrasives, perfect for industrial applications where this kind of atmosphere is a problem. Four actuator designs available: low-force rod; roller lever; in-line plunger and roller plunger. These switches are rated at 20 amperes.

Write for Catalogs 83 and 84 on explosion-proof switches.

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH Precision Switches

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ALEMITE
BARREL-TO-BEARING
LUBRICATION

the "moving force" of production!

More and more, cost-conscious plant men are recognizing modern lubrication as an important "production tool." No longer do they see it as a simple maintenance problem.

With the years-ahead Alemite Barrel-to-Bearing Lubrication method, today's leading manufacturers are stepping up production . . . reducing downtime . . . extending machine life.

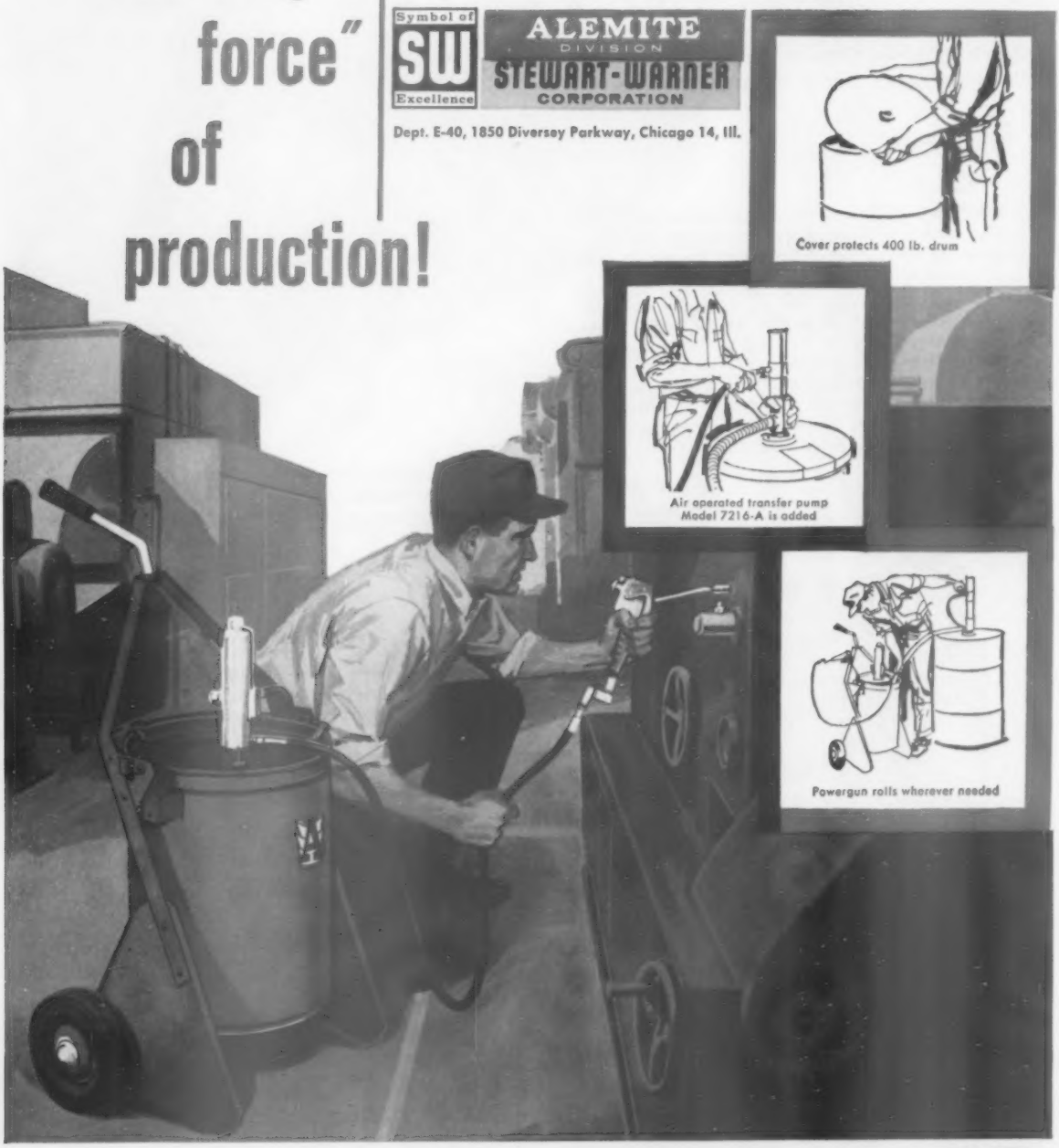
Included in a complete Alemite barrel-to-bearing lubrication method can be electric, air or hand-operated equipment. It will more than meet every need for high-pressure lubrication, filling hydraulic systems, servicing oil reservoirs, lubricating gear housings, and refilling grease guns.

Write for free Alemite catalog today!

Symbol of SW Excellence

ALEMITE
DIVISION
STEWART-WARNER
CORPORATION

Dept. E-40, 1850 Diversey Parkway, Chicago 14, Ill.



Cover protects 400 lb. drum

Air operated transfer pump Model 7216-A is added

Powergun rolls wherever needed

For more facts Circle 418 on Reader Service Card

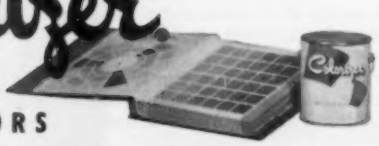
A SCIENTIFIC GUIDE TO THE USE OF COLOR in Industrial Plants

INCLUDING 36 FUNCTIONAL COLORS AND INSTRUCTIONS FOR THEIR USE

This Colorizer Functional Color Kit shows in precise detail how to use **color** in the plant—to promote morale and efficiency, better seeing, greater safety, and improved employee and public relations. Prepared by a nationally-respected color authority, the kit includes a full-color brochure illustrating the specific colors recommended for mechanical areas, wash rooms, cafeterias, drafting rooms, and exteriors. Also included in the kit is a group of Colorizer functional paint color standards—36 paint color chips identified by number and showing reflectance percentage of each. Colorizer Paints are available throughout the U.S. and Canada. Choose from easier-to-use Colorizer "Instant Paint" for interiors... highest quality enamels... floor paints... wood finishes... long-lasting exterior finishes.

Colorizer PAINTS

IN 1,322 COLORS



COLORIZER ASSOCIATES: **Bennett's,** Salt Lake City & Los Angeles • **Blue Ribbon Paint Co.,** Wheeling, W. Va. • **Walter N. Boysen Co.,** Oakland & Los Angeles, Calif. • **Brooklyn Paint and Varnish Co.,** Brooklyn, N. Y. • **James Bute Co.,** Houston, Texas • **Great Western Paint Mfg. Corp.,** Kansas City, Mo. • **Jewel Paint & Varnish Co.,** Chicago, Illinois • **Kohler-McLister Paint Co.,** Denver, Colo. • **W. H. Sweney & Co.,** St. Paul, Minn. • **Vane-Calvert Paint Co.,** St. Louis, Mo. • **Warren Paint and Color Co.,** Nashville, Tenn. • **George D. Wetherill & Co., Inc.,** Philadelphia, Penna. • **The Imperial Flo-Glaze Paints, Ltd.,** Toronto, Canada • **Jonson & Nicholson, Ltd.,** London, England.

Industrial Division
Colorizer Associates
345 North Western Ave., Chicago 12, Ill.

As an aid to be used in specifying color, I would like to have your Functional Color Kit for Industrial Plants.

Name _____

Title _____

Company _____

Address _____

City _____ State _____

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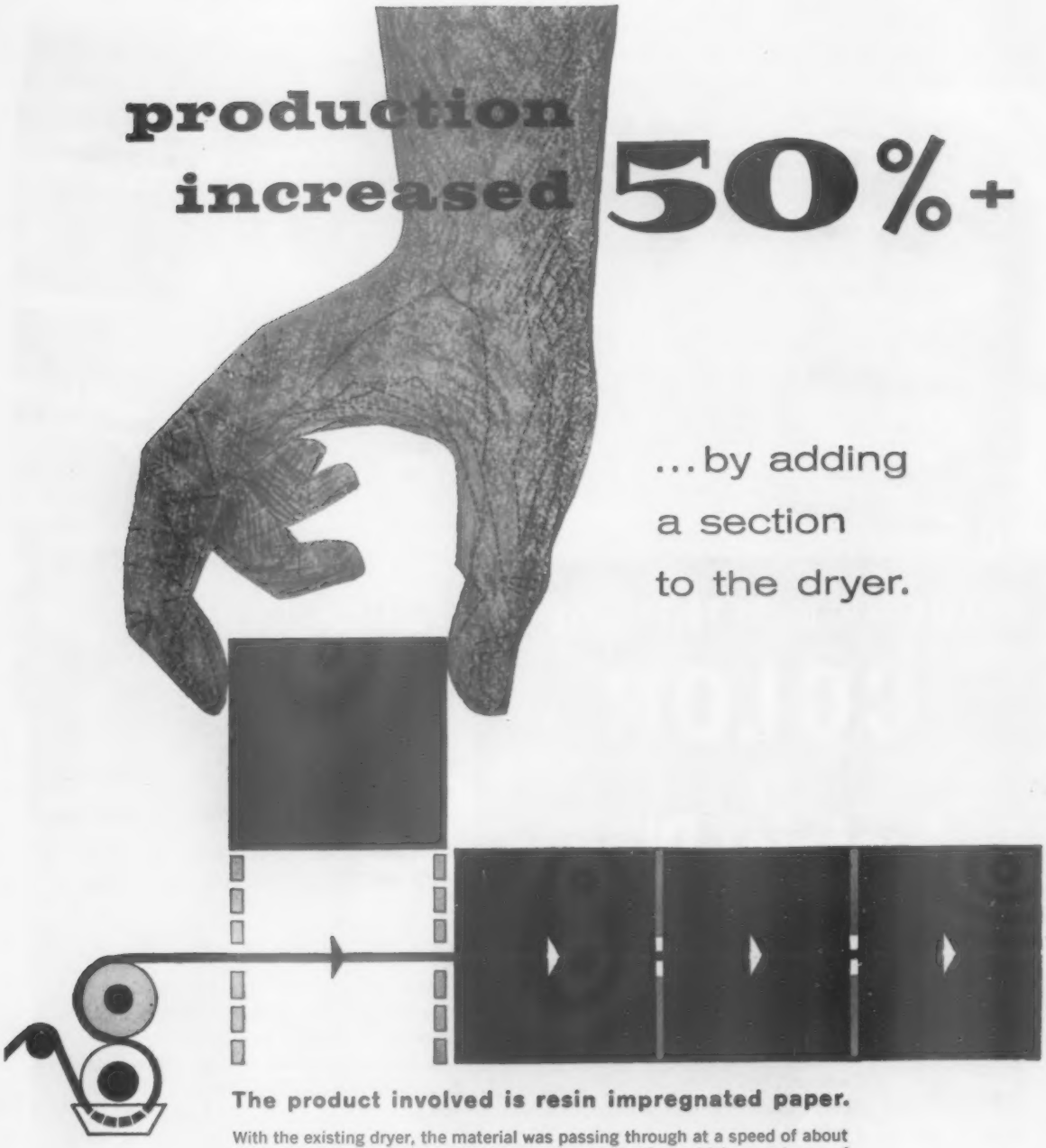
production increased 50%+



...by adding a section to the dryer.

The product involved is resin impregnated paper.

With the existing dryer, the material was passing through at a speed of about 50 ft./min. The owners wanted to increase production, which meant one of two things: a new line or increased output from the existing line, which, in turn, would call for higher speed. But the existing unit could not operate at a higher speed and do a satisfactory drying job.

Ross Engineers studied the problem and, instead of proposing an additional line, suggested the addition of a section at the head end of the existing dryer. It worked out perfectly. Production was speeded up, output being increased over 50% without a large capital outlay.

Studies of this kind are a significant part of Ross service. They enable owners to decide more intelligently whether an entirely new unit or a modernization of an existing unit should be authorized to obtain the needed increased production.

J.O. ROSS ENGINEERING

Division of Midland-Ross Corporation / 730 Third Ave., New York 17, New York

ATLANTA • BOSTON • DETROIT • LOS ANGELES • SEATTLE • MT. PROSPECT, ILL.

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For more facts Circle 421 on Reader Service Card ➤

The Ludlow Method

2-STRIP CASE SEALING

Faster - Stronger - Costs Less

If you're still sealing cases with staples, wire stitching or 6 strips of plain paper tape, you owe it to yourself to investigate 2-strip sealing with reinforced tape.

If you're now using staples or wire stitching, the Ludlow Method offers you:

- Up to 60 more cases sealed per hour.
- Greatly increased case strength and durability.
- Easier opening – no scratched contents or hands.
- Closed center seam eliminating infiltration of dust and foreign matter.

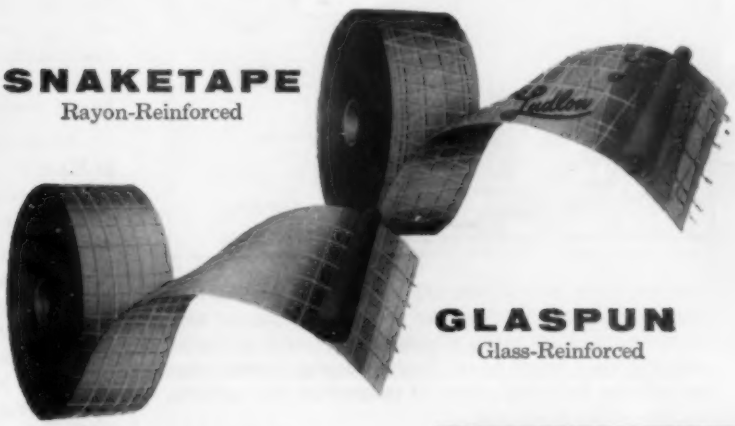
If you are now using 6 strips of plain paper tape, the Ludlow Method offers you:

- Labor savings of 66%.
- Cases that are 200% stronger.
- Neater appearance and water resistance.

Both SNAKETAPE and GLASPUN are approved for shipment on all carriers under U. F. C. Rule 41.

Use the coupon below to get more information.

SNAKETAPE
Rayon-Reinforced



GLASPUN
Glass-Reinforced

VPI-Coated Papers • Greaseproof Papers • Waterproof Papers • Poly-Coated Papers • Gummed Tapes • Federal Spec. Papers • Label and Specialty Papers • Plastics

Ludlow

LUDLOW PAPERS • Dept. 164 • Needham Heights, Mass.

Please send me more information on the Ludlow 2-Strip Sealing Method. I am now using ☐ Staples ☐ Wire Stitching ☐ Plain Paper Tape

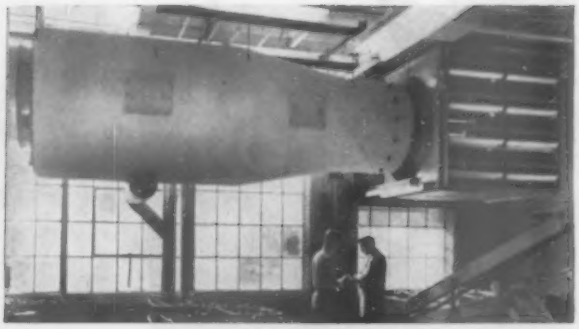
*Name*_____ *Position*_____

*Company*_____

*Street*_____

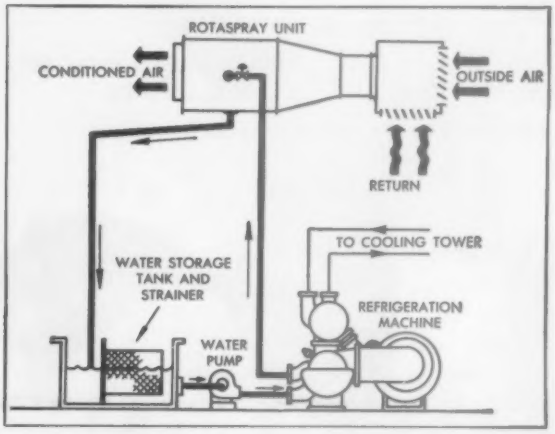
*City*_____ *Zone*____ *State*_____

Roof-top Rotaspray installation



Ceiling-mounted installation

First major advance in industrial air conditioning in half a century...



Rotaspray units are self-cleaning and require no filters. A single refrigeration machine with chilled water storage tank and filter station will handle a multiple-unit system with units located at many remote points. Each Rotaspray Weathermaker unit provides individual control of temperature and humidity.

*THE CARRIER ROTASPRAY WEATHERMAKER SYSTEM**

Here's a major breakthrough in industrial air conditioning—the revolutionary Carrier Rotaspray® System. After five years of actual operation on scores of different applications, it has proved itself superior to past systems three important ways. It provides better, more precise control. It lowers construction and maintenance costs. It occupies less space.

Notice the Rotaspray units shown here. Operating at high air velocity (2600 fpm), they are only ⅓ as large as conventional air-treating apparatus for the same capacity. Each provides automatic, positive control of temperature and humidity in the area it serves.

Other advantages: Rotaspray units are self-cleaning, require no filters and are made of stainless steel for long life. Compact and light, they can be hung from the ceiling, put on the roof or suspended outside the wall. No housing required. Five sizes: 10,500 to 45,000 cfm.

Whether you're planning a new plant or considering air conditioning for your present facilities, you'll find it well worth while locking into the new Rotaspray System. Write Machinery and Systems Division, Carrier Corporation, Syracuse 1, New York. In Canada: Carrier Engineering Ltd., Toronto. ** Pat. Pending*

MORE PROOF OF
BETTER AIR CONDITIONING FOR EVERYBODY *EVERYWHERE*

Carrier

For more facts Circle 422 on Reader Service Card

For more facts Circle 423 on Reader Service Card ➤

This insert printed with Day-Glo litho ink. Day-Glo paint is even brighter.

Day-Glo® shouts safety first!

Day-Glo has little in common with standard safety paints. It is *fluorescent*, with a brightness up to four times greater than ordinary safety paint. Day-Glo can help reduce industrial accidents dramatically! Applied to plant hazards and safety equipment, it shouts its warning on first sight, and up to four times further and faster.

Use Switzer Day-Glo on cranes, danger signs, fork lift trucks, first aid boxes, safety helmets, machinery, fire protection equipment and obstructions of all kinds.

There are five brilliant colors, for indoor or outdoor use, brush or spray application.

SWITZER BROTHERS, INC. Dept. F-4
Industrial Finishes Division
4732 St. Clair Avenue • Cleveland 3, Ohio

Please send me complete product and sales information on Day-Glo Industrial Safety Paint.

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____

☐ Send full information ☐ Have representative call

Sales offices: New York, Chicago, Los Angeles and Berkeley, California

Day-Glo is a registered trademark of Switzer Brothers, Inc., originators of daylight fluorescent colors.

LOWEST COST LIGHTesT WEIGHT

INLAND SMALL PATTERN 4-WAY* SAFETY PLATE

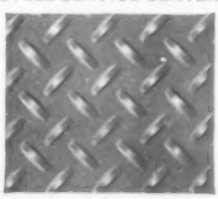
It's a fact—Small Pattern 4-WAY Safety Plate gives you all the protection of raised-lug pattern steel, yet saves many pounds of weight in the finished job and many dollars in initial costs—*Gives you more square feet of protection per dollar than any other rolled steel flooring.*

Thousands of uses in every plant and office—for kick plates, scratch plates, column covers—on walls, truck beds, work benches, machinery platforms, mobile equipment—also on stairways and catwalks where weight-saving is a major factor.

Small Pattern 4-WAY is easily fabricated into any desired shape—can be drilled, sawed and punched with ordinary hand tools. It's easy to maintain and lasts for years.

INLAND small pattern 4-Way safety plate is 18 gage and weighs only 2.4 lbs. per sq. ft. It comes in widths up to 42″ and lengths up to 152″, with a $\frac{5}{8}$″ lug.

AVAILABLE FROM YOUR STEEL SERVICE CENTER

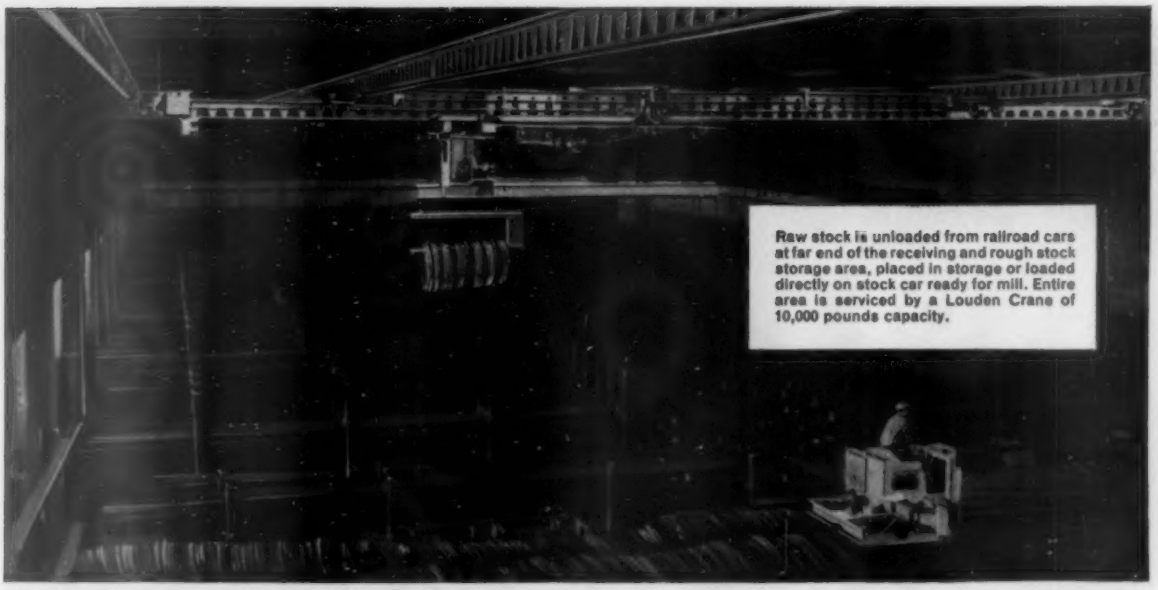


*Registered Trademark

INLAND STEEL COMPANY • 30 W. Monroe St. • Chicago 3, Ill.

For more facts circle 424 on Reader Service Card

FACTORY

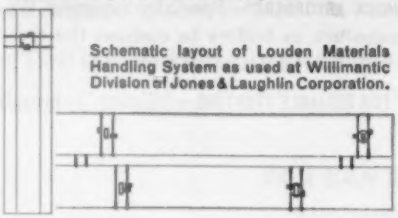


Raw stock is unloaded from railroad cars at far end of the receiving and rough stock storage area, placed in storage or loaded directly on stock car ready for mill. Entire area is serviced by a Louden Crane of 10,000 pounds capacity.

CUT COSTS from the start

Louden Cranes in mill move material through production steps. Here coils have just been removed from acid tanks. Four Louden Cranes handle operations throughout the mill. Two transfer bridges and interlocks provide complete flexibility.

Finished material is placed either in storage or loaded directly into trailers for shipment.



Schematic layout of Louden Materials Handling System as used at Willimantic Division of Jones & Laughlin Corporation.

At the time the Jones & Laughlin Steel Corporation was considering a new plant at Willimantic, Connecticut, a structural engineering firm made a complete study and the results are of unusual interest.

By using an underrunning crane system, it was found that a substantial savings in building and crane costs would be realized, and since this system provided the required effective hook distance at a lower ceiling height, an additional saving in building cost could be obtained. From the start, costs were cut.

All of this points to the one reason why people buy Louden Materials Handling Systems . . . *to make more money*, via economies, expedited handling, much more productive use of manpower and floor space and through sheer increased production. Louden has the equipment, the engineering and the experience. It has pioneered many developments now standard practice in the industry.

When you have plant requirements involving lifting and transporting loads, call on Louden for suggestions. Louden's unparalleled experience and proven engineering leadership combined with Louden's broad line of equipment can save time and mistakes. Write or wire today.

NEW... 52 pages of illustrated applications ... industry by industry. Get the latest and most complete information on planning and equipment selection for the best in modern materials handling. Write today for your copy "COST-CUTTING WITH MONORAIL AND CRANES."

Louden MONORAIL & CRANE

THE LOUDEN MACHINERY COMPANY
405 Broadway, Fairfield, Iowa
A Subsidiary of Mechanical Handling Systems Inc.

SINCE 1867... THE FIRST NAME IN MATERIALS HANDLING

but only the Westinghouse Lamp has six

Despite similar appearance and ratings, these fluorescent lamps are *not* the same. One is a better lamp—and a better buy—because it's the only fluorescent lamp with all 6 advances described below. That lamp is made by Westinghouse. It costs you no more than any other leading brand—but it will give you years of trouble-free, efficient lighting.

1. **MORE EFFICIENT PHOSPHORS**—A special Westinghouse process selects Ultralume™ phosphor particles of a size proven to give more efficient lighting.

2. **BRIGHTER END TO END**—Lead wires are plated with super-hard Chrome Vanadium to make sure Westinghouse tubes *stay* bright, end to end.

3. **BUILT-IN "SHOCK ABSORBERS"**—Specially designed Westinghouse anodes act as buffers to cushion the terrific shock of electron bombardment and improve lamp life.

4. **"RAINCOATS" FOR RELIABLE STARTING**—Silicone "raincoats"

important advances that make it a better buy!

disperse moisture which can collect on exterior surfaces and prevent lamps from starting.

5. MIXED GASES—Westinghouse uses a precise mixture of certain rare gases, under exact pressure, to improve the light output.

6. TRIPLE-COILED ELECTRODES—To protect electrodes from the sudden electron bombardment when the lamp is first turned on. Emission material is quickly heated, fully protected.

Regardless of the type or wattage of fluorescent lamps you buy, you will get better value, more light for your money, and longer, trouble-free service if you specify and insist on Westinghouse fluorescent lamps. Westinghouse makes a complete line, from tiny 4-watt lamps for instrument lighting to the giant 96-inch Super-Hi™ Lamps for store, street, and factory lighting. Contact your authorized Westinghouse lamp agent or nearest Westinghouse sales office.

YOU CAN BE SURE... IF IT'S Westinghouse

WESTINGHOUSE LAMP DIVISION, Westinghouse Electric Corporation, Bloomfield, N. J.

For more facts Circle 426 on Reader Service Card

Problems with heavy bearing and gear loads? Let Gulfcrown®

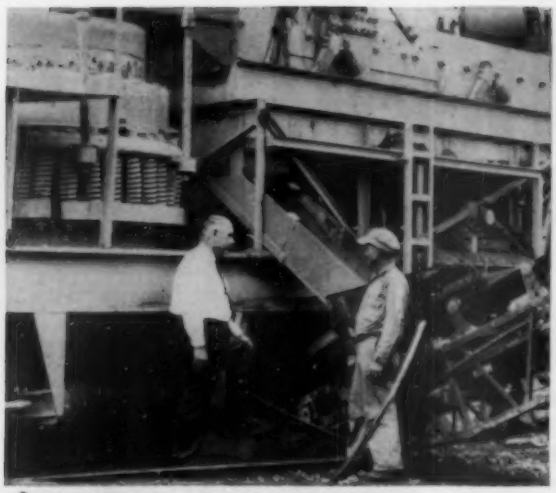
GULF MAKES THINGS

Here's the multi-purpose grease for tough service. It's a superior, lithium-base grease specially developed for use where heavy bearing and gear loads exist . . . where shock loads may occur . . . where machine element action is oscillating.

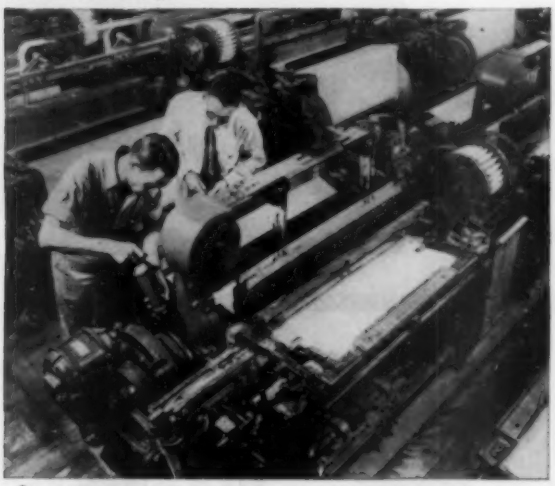
Gulfcrown Grease E.P. will give you plenty of proof that Gulf makes things run better. It resists heat, cold, moisture and mechanical breakdown. It has excellent oxidation stability and protects against corrosion.

You'll find that this grease pumps freely at zero, yet stands up at temperatures to 250°F., and even higher under certain conditions.

Gulfcrown Grease E.P. is an unusually versatile multi-purpose grease. For example, it gives excellent results in the lubrication of heavily loaded trunnion bearings . . . steel mill work rolls and table rolls . . . sliding dog clutches . . . spiral gear boxes . . . Banbury mixers . . . the bearings, cams and gears in textile looms . . . and a great



In hard-working equipment, like stone crushers, Gulfcrown Grease E.P. withstands extremely high shock loads in grease lubricated bearings.



In textile mills, the excellent oxidation stability of Gulfcrown Grease E.P. makes it the ideal lubricant for loom bearings, cams, pick balls and gears.

In steel mills, Gulfcrown Grease E.P. will successfully withstand the high temperatures and extreme pressures encountered in the lubrication of work rolls and table rolls.

Grease E.P. prove that

RUN BETTER!

number of other heavy-duty industrial applications.

Gulfcrown E.P. can be used for electric motor bearings, fans, pumps and for nearly every type of application. Can be applied through centralized systems or by gun. Available in NLGI consistencies 0, 1 and 2.

Find out how Gulfcrown Grease E.P. can improve your operation and help you get lower maintenance costs. Call your Gulf Sales Representative at the nearest Gulf office. Meanwhile, mail coupon for booklet.

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

Please send booklet on
Gulfcrown Grease E.P.

Name _____
Title _____
Company _____
Address _____
City _____ Zone _____ State _____

F-5209

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ER-6
Heavy-Duty Compressors

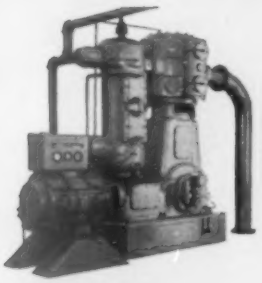
New! Fundamental improvements over conventional, typical heavy-duty compressors provide these three big advantages: (1) Only 18.3 hp required per 100 cfm at 100 psi, full load—10 to 15% lower than most compressors of this size! (2) Completely enclosed functional design protects external lines and fittings. (3) Extremely small space and simple concrete block required for permanent fixing—save on floor space, material and labor!

Plus—capacities to 1,140 cfm; standard instruments and safety devices; built-in reliability and long life for which Atlas Copco has been famous for more than 50 years!

Atlas Copco Atlas Copco Atlas Copco

Which... ATLAS COPCO COMPRESSOR

meets your needs best?



AR Heavy-Duty Compressors

More air per horsepower than any comparable compressor! For continuous, full-load operation. "L" angle, 2-stage, double acting. Water cooled. Standard models provide 382 to 3210 cfm free-air delivery at 100 psi; only 76-590 hp required! (Can be supplied for other working pressures on request.)

What's your compressor requirement? Need an installation large enough to provide air for all your needs? Or would a small, compact unit for auxiliary operation solve your immediate problem? Either way—and for a wide range of applications between these extremes—Atlas Copco has the compressor for you!

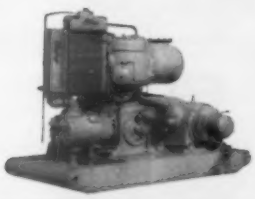
No matter which you choose, you'll get these proven advantages from Atlas Copco:

(1) More air per horsepower—less power consumption than other comparable units!

(2) Really low maintenance (one example — $3.10 after 10,000 hours' operation)!

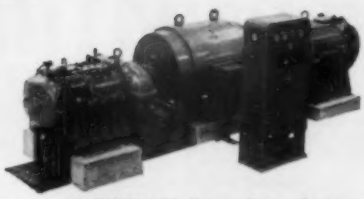
(3) Specifications are guaranteed free-air delivery — you get exactly what you order!

Get all the facts now—and compare! The coupon below will bring you a free catalog. (No obligation, of course.)



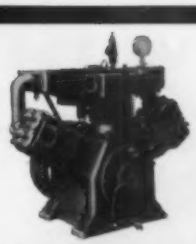
AR-L Heavy-Duty Compressors

Same basic construction as the AR Series, but provided with an air-cooled intercooler and air-cooled radiator for the cylinder water. Fan on compressor flywheel cools radiators. Perfect for arid areas or where difficult to bring in water. Both stationary and skid-mounted models available.



TWIN-AIR Rotary Screw Compressors

Brand new! "Twin-Air" Compressors offer capacities from 6,900 to 19,400 cfm at working pressures up to 115 psi. And, you get completely oil-free delivery of air or gas, since no lubrication is required — timing gears maintain small clearances between precision-mounted rotors, eliminating friction (and the necessity of oil) in compression chamber.



CT Air-Cooled Compressors

Stationary, or skid-mounted compressors for use where air demand is between 50 and 300 cfm. Totally air-cooled. Cylinder arrangement designed for smooth, vibration-free operation. Compact, rugged—for continuous, 24-hour trouble-free service. Highly efficient; low on maintenance costs.

FREE!

Write today for your free copy of our short-form catalog, describing the line of Atlas Copco stationary compressors. Ask, too, for detailed information on the model you need most. Use the handy coupon at right.

ATLAS COPCO
Dept. F-4, 545 Fifth Avenue,
New York 17, N.Y.

Gentlemen:
Please send me ☐ Short-form catalog ☐ Detailed information on the _____ Series

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

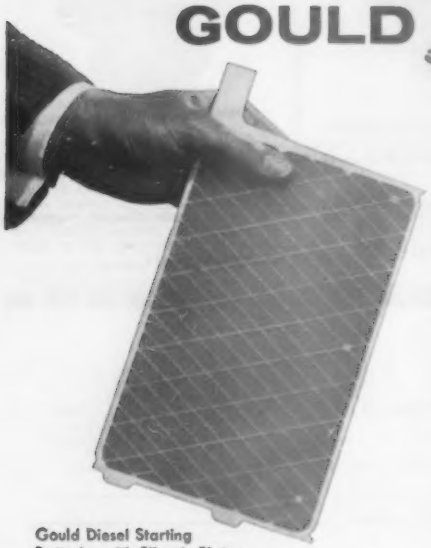
Atlas Copco

610 Industrial Avenue
Paramus, New Jersey
COlfax 1-6800

930 Brittan Avenue
San Carlos, California
LYtell 1-0375

25% MORE BATTERY LIFE FREE!

WITH THE NEW GOULD *SILCONIC* PLATE



Gould Diesel Starting Batteries with Silconic Plates resist corrosion, hold their charge and last longer.

Used in all diesel starting batteries, the Silconic Plate prevents grid corrosion, the most common cause of battery failure. Here's the principle: Gould introduces silver and cobalt into active materials of the positive plates. Silver and cobalt migrate to—and collect on—positive grid members, forming an insoluble oxide surface impervious to acid and oxygen attack. The longer the battery operates, the deeper the silver-cobalt penetrates into the grid metal, thus prolonging life. In applications where batteries are idle for periods of time, Gould's Silconic Plate prevents migration of materials to the negative plate, effectively reducing self-discharge within the cell.

For greater overall strength, arsenic is added to the antimonial alloy of the plate, resulting in an extremely dense, homogeneous grid *free of flaws.* This vital new physical and chemical strength—together with Gould's compact battery design—add up to the most advanced diesel starting battery you can buy. Write today or call your local Gould representative. He's listed under "Batteries Industrial" in the yellow pages. Gould-National Batteries, Inc., Trenton 7, N. J. *IN CANADA, WRITE TO GOULD-NATIONAL BATTERIES OF CANADA, LTD., 1819 YONGE STREET, TORONTO, ONTARIO.*

More Power to you from **GOULD**

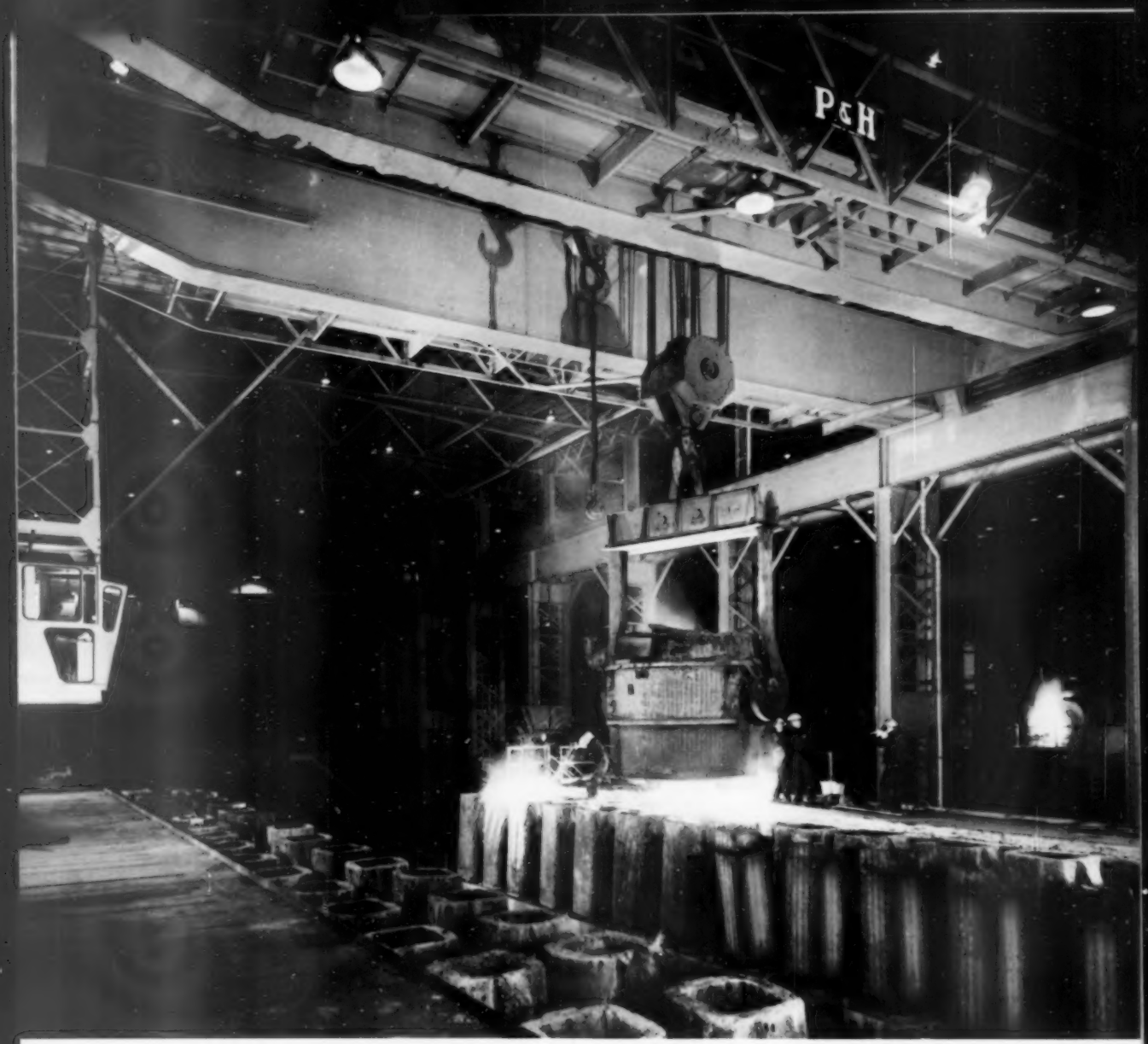


Photo courtesy Acme Steel Company, Riverdale, Illinois.

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

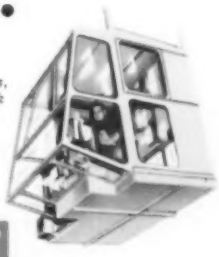
IN STEEL MILLS: This 100-ton P&H crane lifts, transports and "spots" tremendous loads of molten steel as surely and deftly as you handle a coffee cup.

P&H steel mill cranes perform tasks like this effortlessly and dependably because they are specifically designed for steel mill service . . . to handle massive loads, withstand searing heat, ignore frequent shock loads.

What's more, P&H carefully engineers every crane to meet specific job requirements . . . to consider all factors affecting performance. Special operating problems are taken in stride. Result: P&H cranes chalk up almost unbelievable service records month after month, year after year, decade after decade.

Isn't this the kind of performance you want, too? Write for bulletin C-42 to Dept. 120, Harnischfeger Corporation, Milwaukee 46, Wis.

P&H enclosed cabs have full-view safety glass windows, for unrestricted view of work area. Cabs can be heated and air conditioned where cold, heat, smoke or fumes render ordinary cabs uncomfortable or unsafe.



P&H
OVERHEAD CRANES

HARNISCHFEGER
Milwaukee 46, Wisconsin

Photo: Courtesy Isaacson Iron Works Co., Seattle, Washington

P&H PRECISION CONTROL SPOTS HEAVY STEEL ACCURATELY, SAFELY

This West Coast steel-fabricating company depends on P&H Balanced Design Hevi-Lift hoists to keep heavy steel beams and fabricated structures moving through its shops.

Note the unique method of installation which provides a high degree of flexibility . . . hoists can be used alone — or hoists can be teamed up to handle extra-long sections.

This company selected P&H Balanced Design Hevi-Lifts because they will stand up longer, under heavier duty cycles — with less maintenance — than any other hoist they could buy. Reason: Balanced Design means that every component has been balanced with every other component for maximum strength and performance characteristics.

If uninterrupted through-the-air material handling is important to you, too, then it will pay you to find out more about these new hoists. Send for bulletin H-55, Dept. 222, Harnischfeger Corporation, Milwaukee 46, Wis.

HARNISCHFEGER
Milwaukee 46, Wisconsin

P&H
HEVI-LIFT HOISTS

Allied Chemical Corporation* Cuts Eye Accidents 85% Saves Eyes, Lowers Costs with AO Protection Program

(*Plastics and Coal Chemicals Division, Frankford Plant, Philadelphia, Penna.)

When a company or plant can cut reportable eye injuries by 85% in 10 years (1948-1958) it wins in many ways. Because eye injuries average $432 in cost for compensation alone (Source: National Safety Council), a company lowers operating costs significantly. Annual savings well up in five figures are common. Add to these the savings in first aid, hospital and medical care and in the "hidden costs"** which are considerable.

What's the cost of protection? $2.65 is the average price of safety glasses. Put them on 1,000 production workers, for example for $2,650. Prevent just 10 eye accidents (savings in compensation *alone*, $4,320). *Net* savings, $1,670. An AO Eye Protection Program featuring the right safety standard frames and lenses for man and job is an investment with built-in savings. Write for new booklet, "Eyes Are Expensive Targets."

**Idle equipment charges, lowered production quality, increased spoilage, etc.

Always insist on ® *Trademarked Safety Products*

American Optical
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Fortify a primer with FOUR protective pigments. Build in special "wetting" action to saturate and seal rough surfaces. Cover with tough, elastic, premium enamel made with chemical and fume-resistant pigments for *all* colors—and you have new, long-lasting protection for *any* exposed metal surface!

Sherwin-Williams METALASTIC Primer and METALASTIC Enamel incorporate new advances in paint chemistry that mean lower per-year costs for industrial maintenance painting, even under unfavorable conditions of application or surface preparation. New light, bright colors *stay* light and bright. Long-oil formulation insures long-lasting durability. And high-solids content gives longer-lasting high film build even on protruding edges and corners.

Get all the facts on METALASTIC—see the new METALASTIC colors! Call your local Sherwin-Williams Branch—in all principal cities. The Sherwin-Williams Co., Industrial Maintenance Division, Cleveland 1, Ohio, or Montreal, Canada.

☐ Send booklet "How To Save"
☐ Send more facts on METALASTIC

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Company_____
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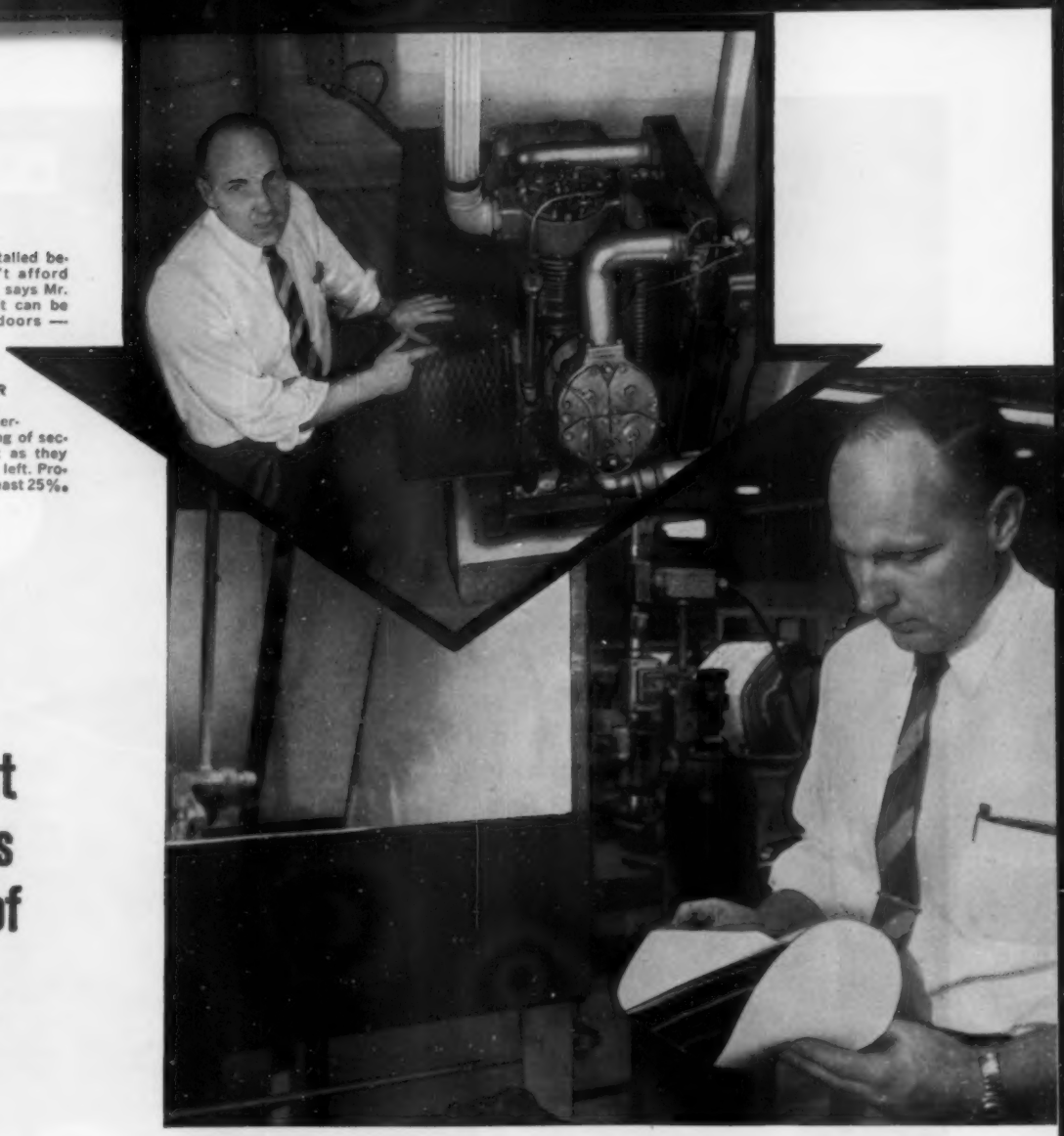
City_____

How to Save SAFELY When Painting Your Plant
This free booklet tells how... shows *what* to use *where*.
Send for it, together with more facts on METALASTIC.

SHERWIN-WILLIAMS
MAINTENANCE FINISHES



LE ROI 50S2 was installed because Bowes couldn't afford compressor downtime, says Mr. LaFara. Air-cooled unit can be used indoors or outdoors — needs no plumbing.

FINISHED TIRE REPAIR SECTION is inspected. Compressed air now permits automatic spraying of sections with liquid latex as they pass through booth at left. Production increased at least 25%.

This plant minimizes the risk of "no air - no work" with a

LE ROI 50HP STATIONARY COMPRESSOR

A dependable compressor headed the list of critical needs when Bowes Seal Fast Corp., of Indianapolis, Ind., merged two plants under one roof. A Le Roi 50S2 two-stage compressor provides this vital dependability . . . and all the compressed air needed to produce over 2000 various items for the upkeep of cars, tires, and tubes.

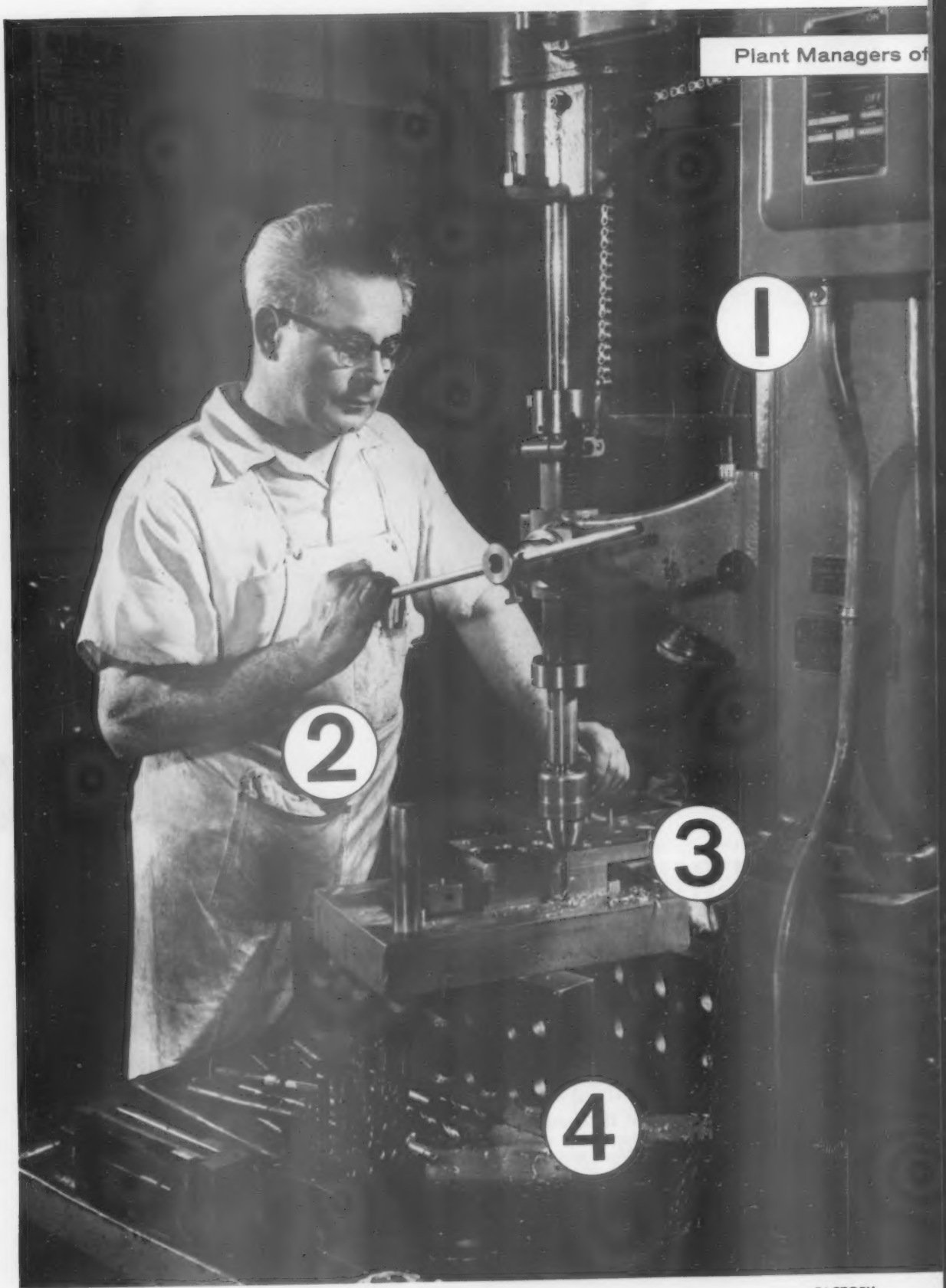
James S. LaFara, Plant Manager, reports that the Le Roi unit delivers 210 cfm at 125 psi . . . operates 75% to 80% of 8- to 16-hour production days, five days a week, and supplies almost 100% of all the compressed air needed. Down-time, he adds, is at a minimum, and maintenance costs are below those of two smaller compressors which the Le Roi replaced, and which now serve only as standby units.

Look what this Le Roi 50S2 does! It provides air to spray tire-repair sections (boots) and tubeless-tire repair plugs with a mixture of liquid soap and water. The unit powers latex spraying machines, and blows scraps from tube-patch cutting machines. Other uses include air for lead moulding equipment, nut-driving units, cleaning vents on chemical filling machines, and for the plant's fire-protection system.

Are you looking for a "dependable" compressor? Check the complete line of Westinghouse unit-type and Le Roi stationary air compressors — from ½ to 100 hp. Contact your Le Roi distributor, or write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin. SC-08

LE ROI STATIONARY COMPRESSORS

PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS


Plant Managers of
1
2
3
4

America know: **A**merican **M**utual aims at Better Protection . . . Lower Cost

Just a routine drill press operation . . . but think of the losses if:

1. Electrical parts had been unprotected and resulted in injury to the operator.
2. Clothing had been loose and were to wrap around the drill.
3. Protective glasses were not worn and flying chips were to be thrown into the eyes.
4. Supports for work set-up overturned.

Routine jobs can be the most dangerous ones. They're taken for granted . . . and that's when hidden hazards appear. Next thing you know . . . accident.

That's where your AM man comes in: he can help you prevent costly accidents . . . keep your workmen's compensation costs down. His aim is that workers keep safe on the job. Keep machines humming instead of harming. Keep production flowing instead of falling.

To do this, an AM Safety Engineer studies your plant's entire operation . . . searches out potential dangers . . . suggests safety measures. Highly trained Industrial Hygienists and other specialists on our staff are at your service to help you increase your production flow . . . improve your safety record.

How has this broader, more experienced service benefited AM policyholders? Typical case: American Mutual's specially trained men helped reduce premiums for Franconia Paper Corp. of Lincoln, New Hampshire, by more than $77,200 in eight years.

Add to that—$26,832 realized in dividends and you begin to get an idea how American Mutual can improve your plant's profit picture. American Mutual Liability Insurance Company, Dept. F-2, Wakefield, Massachusetts.

Our business is protecting your business . . . better

"The First American Liability Insurance Company" . . . a leading writer of Workmen's Compensation, all forms of Liability, Crime, Automobile, Group Accident and Health Insurance.

American Mutual

LIABILITY INSURANCE COMPANY

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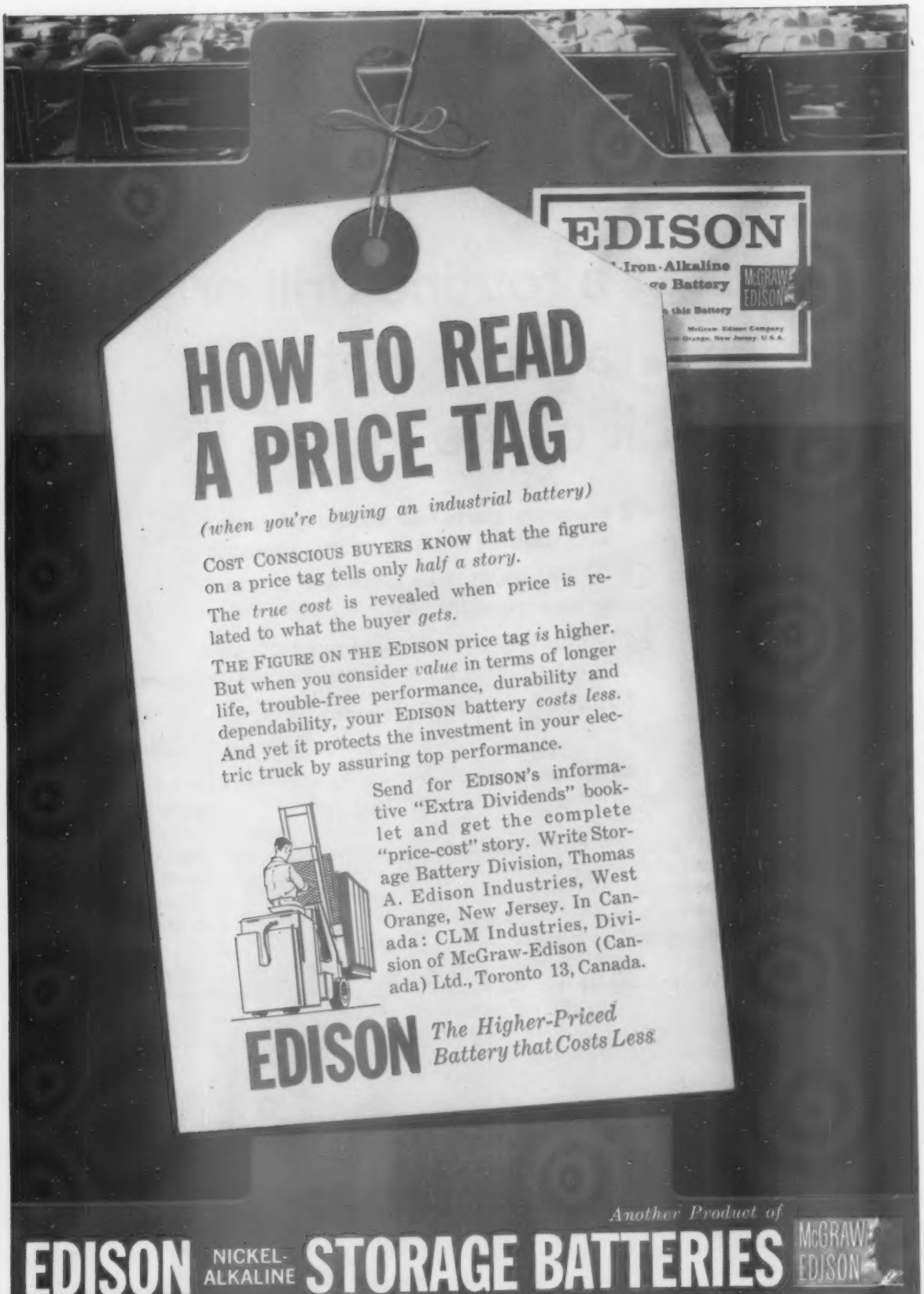
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McGRAW EDISON
HOW TO READ A PRICE TAG
(when you're buying an industrial battery)
COST CONSCIOUS BUYERS KNOW that the figure on a price tag tells only half a story.
The true cost is revealed when price is related to what the buyer gets.
THE FIGURE ON THE EDISON price tag is higher. But when you consider value in terms of longer life, trouble-free performance, durability and dependability, your EDISON battery costs less. And yet it protects the investment in your electric truck by assuring top performance.
Send for EDISON's informative "Extra Dividends" booklet and get the complete "price-cost" story. Write Storage Battery Division, Thomas A. Edison Industries, West Orange, New Jersey. In Canada: CLM Industries, Division of McGraw-Edison (Canada) Ltd., Toronto 13, Canada.
EDISON
The Higher-Priced Battery that Costs Less
Another Product of
EDISON NICKEL-ALKALINE STORAGE BATTERIES
McGRAW EDISON

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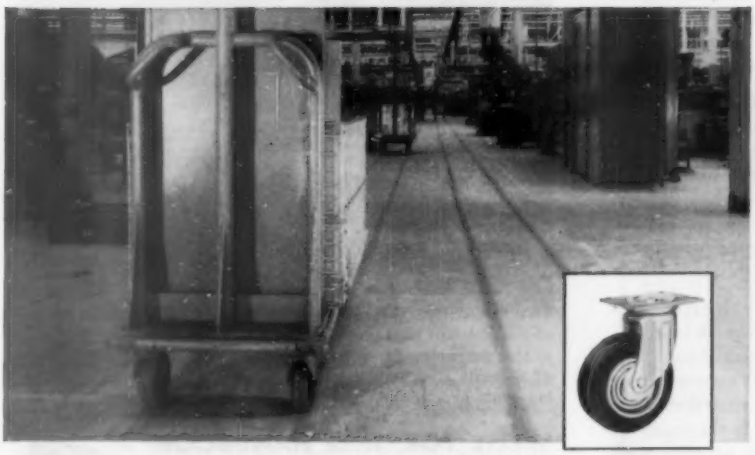
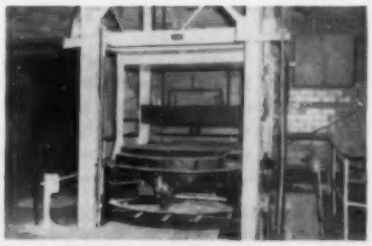
MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

How drag-line trucks on Bassick Casters save money at Western Electric



At Western Electric's Andover plant in Massachusetts, trucks on a continuous drag-line route deliver materials and remove finished parts at a steady 1½ mph. Carts can be automatically switched from main conveyor route to stop at any department—as needed. Simplicity of operation and easy movement through manufacturing process adds up to materials handling economy.



Automatic Conveyor at Bowaters Southern Paper Company, Calhoun, Tenn.

This vertical paper conveyor moves on 8 Bassick Casters

The Lamson Corporation, designers of this automatic conveyor system, points out that there can be no unimportant parts because failure of any one would shut down the entire mill. Eight Bassick Swivel Casters, Series "77," provide vital movement for the conveyor that loads and unloads itself, revolves, tilts and shuts itself off. It moves rolls of newsprint that weigh up to 2,500 pounds, and is part of in-plant distribution system between production floors, storage and truck, rail and barge transportation. This is typical of the way Bassick Casters help resolve key materials handling problems by helping to move finished products as well as parts, equipment and raw materials.

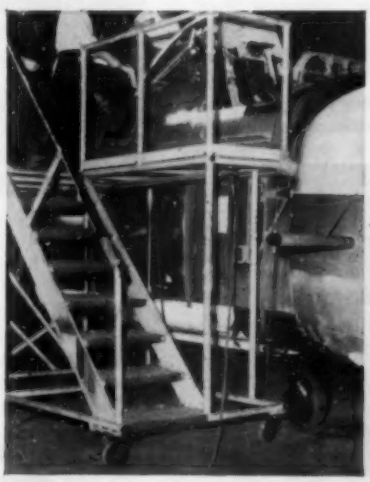
Built for rough service

Brings quiet, easy swiveling action to some of industry's *roughest* caster applications. Popular for both general factory use and in warehouses, stores and institutions. Case-hardened bearing surfaces and specially formed structural steel shapes combine to deliver the economical values of long wear and extra strength. Projection welded oversize ball raceways add to service life. Wide range of wheel sizes and types make Series H-99 useful for many needs.

A GOOD MAN TO KNOW!

Local industrial distributors who handle Bassick casters can advise you on specific casters that will best solve your materials handling problems. They stock popular models.

Bassick Casters help hatch Whirlybirds



Men at work on rotor head of another Sikorsky helicopter at Stratford, Connecticut. Notice how Bassick levelizing jacks hold the maintenance stand still and rigid while work proceeds. Later, it will roll easily away on its 8-inch, Series 77 Bassick casters.

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

Symbol of SW Excellence
Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

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RAPISTAN HANDLING Ideas

HOW MANY WAREHOUSES CAN YOU FIND IN YOUR PLANT?

Sometimes you can't see the warehouses for the machines. Most plants have no trouble identifying at least two areas where warehousing goes on. The first that come to mind are the receiving and shipping areas.

But how many unrecognized warehouses are you operating? It could be quite a few. When the flow of material through any plant is analyzed, build-ups of work are frequently found before and after each operation. These build-ups of material, in themselves, create warehousing problems. And, big or small, these "hidden" warehouses may be costing you more than you realize.

In almost every plant, these little warehouses are likely to be out of phase with where they should be, and how big they should be for maximum flow efficiency. Sometimes the most practical arrangement is a simple storage rack. Other times overhead storage on Rapistan-Keystone trolley conveyor is the answer. Sometimes greatest efficiency can be gained with a more complex live storage Flow Rack equipped with mechanical indexing and selection devices.

In any case, by streamlining and simplifying the operation of your hidden warehouses, you can gain better utilization of space and control of inventory first-in-first-out use of materials, cut down on spoilage and damage costs, and improve your entire handling pattern.

Rapistan engineers specialize in recognizing these less obvious areas, and developing modern storage conveyors for just such problems. They've developed some new concepts of "stop-and-go" storage that have brightened the profit picture for thousands of manufacturers, as well as for wholesalers and retailers. If the "hidden warehouse" in your plant is not as efficient as the rest of your operations, or if you just suspect that it isn't, call on your Rapistan engineer.

RAPISTAN FLOW RACK IS THE HEART of this mechanized selection system used in the shipping department of one of the world's largest record manufacturing plants. A remote-controlled belt conveyor takes cartons from any hatch in the rack, conveys them to a checking station en route to the shipping dock.

WAREHOUSING OF PARTS AND COMPONENTS goes on right at the point of manufacture in this plant. Flow Rack, positioned at the perimeter of the work area, holds the optimum quantity of all parts used here. It's loaded from the rear, without interfering with production.

WRITE FOR THIS HANDBOOK of materials handling ideas, describing all the latest Rapistan conveying equipment, plus lots of application information, suggestions and tips for conveyor system engineering.

R-K AUTOMATIC TRANSFER PUTS NEW PROFITS IN OVERHEAD HANDLING

Saved — $6,000.00 a year on rack maintenance.
Saved — 40% reduction in direct labor.
Saved — large area formerly used for storage.
Gained — 70% increase in plating production.
That's the profit-boosting record of benefits realized by a large midwestern plating plant, after modernizing production with an overhead conveyor system engineered by Rapistan-Keystone, featuring an unusual automatic transfer.

Rapistan®
CONVEYING EQUIPMENT
The RAPIDS-STANDARD CO., Inc.
691 Rapistan Building, Grand Rapids 2, Michigan

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FACTORY PRESS TIME REPORT • APRIL 1960

Looking Ahead in Business

Some of the mid-winter doubts about the business outlook should disperse in the weeks ahead. One big reason is that capital expenditures will continue to increase during 1960.

Business spending for new plants and equipment will be up 14% over 1959, according to the latest survey of business plans by the U. S. Department of Commerce and the Securities & Exchange Commission. Capital spending will rise from an estimated annual rate of $35.3-billion in the first quarter (when it was almost $2-billion higher than the rate in the final quarter of 1959) to $36.9-billion for the second quarter. And the survey indicates that expenditures in the last half of 1960 are expected to be higher than in the current half.

•

Levels of inventories are among other factors that favor a healthy rise in business in the months ahead. Actually, inventories have risen considerably in recent weeks. But much of the rise has been in stocks of finished automobiles that have piled up while sales lagged. In other sectors there is still room for further inventory accumulations.

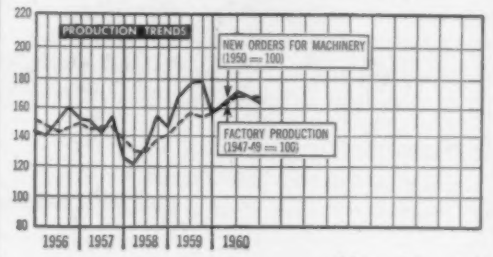
At the end of January, inventory sales ratios in many areas were still below the levels of a year earlier. Many businessmen have been cautious about adding to their stocks because sales in some areas—notably autos—have lagged. But a set-up in capital expenditures, such as that indicated in the survey, may lead to heavier inventory buying in those areas where stocks have not yet been rebuilt.

•

Meanwhile, personal incomes continue to show improvement. Total personal income for February inched over the mark set in the previous month to a new high of $393-billion, at an annual rate. But wage and salary payments in manufacturing slipped, with cutbacks in auto production during the month.

Cuts in auto production also figured in the dip in total industrial output that was registered during February. The index of industrial production fell from January's record-high 169 to 168, the first cut in industrial output since the steel strike ended. But this figure does not affect over-all business activity which should remain healthy.

FACTORY FIGURES OF THE MONTH



Indicator	Feb.[P] 1960	Jan.[r] 1960	Feb. 1959
New Orders for Machinery (exc. elec.)[1]	164.0	172.0	176.0
Contracts for Industrial Construction[2]	159.0	129.0	122.0
Factory Production[3]	167.0	168.0	153.0
Consumers' Prices (cost of living)[4]	125.6	125.5	123.8
Industrial Prices (materials, supplies)[4]	128.8	128.8	127.8
Manufacturing Employment (millions)[4]	16.5	16.5	15.8
Total Employment (millions)[5]	64.5	64.0	62.7
Unemployment (millions)[5]	3.9	4.1	4.7

[P] = preliminary [r] = revised

Sources: 1. McGraw-Hill Department of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Department of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Department of Labor, Bureau of Labor Statistics.

One area that continues to hold up better than anticipated is construction. Home construction, now in a seasonal slump, will be one factor making for a bright outlook in the months ahead.

One reason for the probable strong showing of housing activity is easier mortgage money. Easier money for general business is also likely to develop in the weeks ahead. There is no indication of a reduction in the Federal Reserve discount rate to banks, but it's a safe bet that the Fed will not be holding back on credit as tightly as in 1959.

Capital spending will not surge because of easier money. Reason: Last fall's McGraw-Hill survey showed that most corporations would not be relying on the money market to finance capital expenditures. But easier money can be an aid to smaller businessmen. And an aid to consumers who can turn to banks rather than finance companies for easier—and cheaper—loans, thus helping to boost sales of consumer durable goods as well as homes.

Leads to Read and Save

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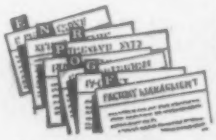

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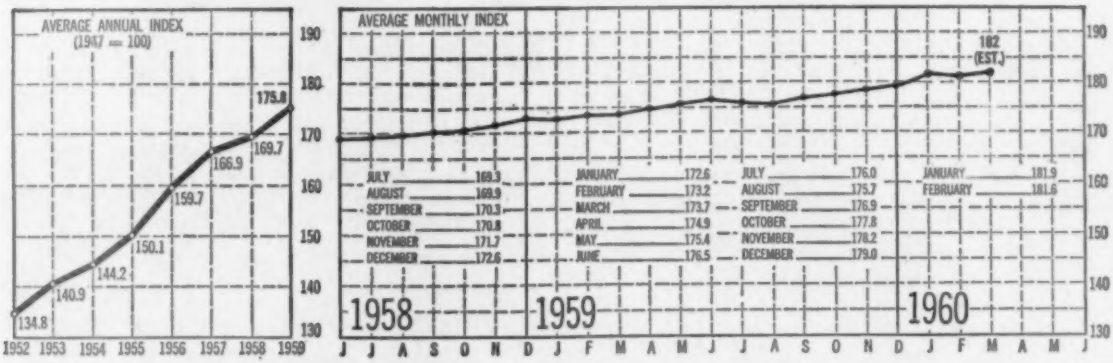
FACTORY PRESS TIME REPORT • APRIL 1960

Cost Index of Plant Maintenance



Index Dives at Last

A few large price declines carry Index to first retreat since last summer

With the unpredictability of late winter weather, FACTORY's Cost Index of Plant Maintenance dropped 0.3 of a point in February to a level of 181.6. It was the first time the barometer had retreated since August 1959.

A sharp decline in the price of roofing materials from 120.7 in January to 113.0 in February had a significant effect on the over-all Index, dragging the buildings and facilities component to a new low. A one-point decline in the price of heating equipment also helped here.

Price increases outnumbered price declines by about three to one. The cost increases, however, were limited to a fraction of a point for most items. Therefore, the aggregate effect of the price rises was relatively small. The price of sanitary fixtures continued the upward trend it has followed during the last two months with a rise of 0.3 of a point in February. A few maintenance materials made of steel rose in price again in February. Among them were valves and fittings (up 0.7 of a point), steel tanks (up 0.3 of a point), and both precision tools and mechanics hand tools (up about 0.9 of a point). Trends mentioned last month indicated these increases.

Labor costs are important again this month. Their sharp increase in January, which pushed the Index up by 0.8 of a point, has been revised upward. This means labor costs really rose more in January than preliminary figures had indicated, and that's always bad news. Why? Because labor expense usually represents 60% or more of the total cost of maintenance jobs.

	AVERAGE 1959	FEB. (Preliminary)	JAN. (Revised)
Building and Facilities Index	166.5	169.3	169.8
Materials	142.3	141.4	142.7
Brick	152.5	154.3	154.3
Elec. fixtures	129.0	132.4	132.4
Elec. switches, boards, fuses	185.6	187.1	187.1
Elec. wire, copper	138.9	148.6	148.6
Glass	152.0	152.0	152.0
Gutters, spouts, ducts	178.0	180.2	180.2
Gypsum products	140.8	140.8	140.8
Heating equipment	127.7	126.3	127.3
Lumber	134.5	133.3	133.3
Millwork	155.7	157.8	157.9
Paint	130.1	130.1	130.1
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.9	192.6	192.6
Pipe & tubing, copper	154.1	161.0	161.0
Roofing	123.7	113.0	120.7
Sanitary fixtures	155.6	164.1	163.8
Sash, metal frame trim	140.9	139.5	139.0
Solder	124.1	122.3	120.3
Steel, structural	236.3	236.3	236.3
Tanks, steel	138.0	140.1	139.8
Valves & fittings	166.7	171.9	171.2
Wire mesh	162.6	162.9	162.9
Labor	182.6	188.0	188.0
Carpenters	168.9	173.0	173.0
Electricians	191.1	196.9	196.9
Painters	187.9	194.2	194.2
Equipment Index	179.5	186.9	187.1
Materials	176.1	178.4	178.3
Abrasives	161.0	157.9	157.9
Alloys, non-ferrous	125.4	125.3	124.5
Bars & plate, steel	227.1	227.2	227.2
Bearings	164.1	164.6	164.6
Belting	157.3	159.5	159.5
Bolts, nuts & screws	225.6	226.1	226.6
Chain	184.0	184.0	184.0
Controls (electrical)	185.6	187.1	187.1
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	198.2	201.1	200.4
Lubricants	124.1	125.7	125.7
Motors	147.3	148.2	146.7
Non-ferrous metals	129.0	136.6	136.6
Precision tools	156.6	158.7	157.8
Pumps	194.8	195.2	195.2
Tools, cutting	172.4	182.4	182.4
Valves & fittings	166.7	171.9	171.2
Labor	181.8	192.6	192.9
All mfg. labor	179.9	184.4	185.2
Machine tool labor	184.2	200.7	200.7
FACTORY'S COST INDEX	175.8	181.6	181.9

FACTORY PRESS TIME REPORT • APRIL 1960

Looking Ahead in Labor

The Kaiser Tripartite Committee is uncovering important evidence on the steel industry's collective bargaining troubles in the past—and what it faces in the future.

This is the nine-man committee set up in the first settlement of the 116-day steel strike, between the United Steelworkers of America and the Kaiser Steel Company. Its assignment: to develop a long-range plan for the equitable sharing of economic progress of the Kaiser Company among management, labor, and the public.

At settlement time, the committee was heralded as the way to avoid recurring steel strikes. And a successful formula for steel could, of course, be adopted throughout industry as a whole.

The committee's work is being closely watched by unions and employers alike. Headed by Arbitrator George W. Taylor, it has barely scratched the surface of its task. However, it has uncovered two issues that could cause serious trouble in future negotiations and is giving them top priority study:

• **An anticipated fast advance of automation will cause much bigger steel unemployment than in the past.** In recent years, new methods and machinery in steel have caused permanent layoffs of up to 200,000 steelworkers. This is now considered small, compared to payroll reductions expected in the future. The problem: how to take care of displaced workers in collective bargaining.

• **The steel industry's incentive systems have thrown the steelworkers' pay out of line with other industries.** The auto workers, for example, have fallen more than 30 cents an hour behind steel rates. Their pay scales have been based on hourly rates; incentive pay in steel has been growing because of the production increase through new machinery. As automation spreads in steel, wages will rise accordingly. The problem: to overhaul the steel incentive system to keep steel wages from out-gaining pay of other industrial workers.

Solutions to these problems won't come quickly. The Kaiser contract calls for committee recommendations by July 1, 1960. This target date is now dropped. The committee will issue an interim report at this time, but expects to take the full life of the 23-month contract to come up with some of the answers. As the Kaiser-Steelworker contract reads, any solutions could be put into the contract on July 1 "in substitution for its wage and cost-of-living provisions." These provisions, however, will go into effect on schedule.

•

Charges of violations of the Landrum-Griffin "Bill of Rights" are flooding Labor Department investigators. Complaints by union members against their officials are averaging 150 a month—and nearly 1000 have come in to the reform law's chief enforcer, Daniel L. O'Connor, of the Department's Bureau of Labor-Management Reports.

Complaints come mostly from local unions. Members charge their leaders with taking kickbacks. Claim their unions are controlled by racketeers, who stifle opposition within the union. In one key case, O'Connor's investigators are pursuing evidence in the murder of Herman Posner of the Chicago Moving Picture Machine Operators' Union, Local 110. Posner was knifed to death shortly after he told investigators of corruption in his local.

An example of the fast pace of complaints: O'Connor's Bureau already has 101 complaints of union election violations—even though it isn't yet permitted to make investigations of these.

Not all complaints are justified. The Bureau is uncovering "habitual complaints"—by the "outs" against the "ins" and ordinary personal feuds. Biggest investigative weapon of the Bureau is the subpoena, but even then necessary evidence is hard to come by. Where the McClellan Committee could simply "expose" corruption, Bureau investigators must get evidence that will stand up in court. Prosecutions, as a result, will be slow in coming.

Proper jurisdiction is also a critical problem. Cases can be pursued only if they violate the law. The Posner murder in Chicago, for instance, must be tied with his effort to turn evidence over to the investigators. If this isn't established, the reform investigators must drop this case. However, this wouldn't end the probe of Posner's union local.

SEE LABOR RELATIONS NEWS, PAGE 228

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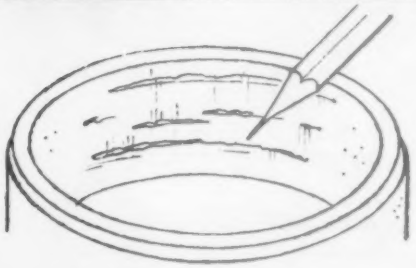
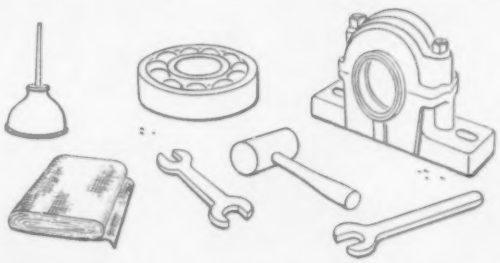
DISTRIBUTOR DAN the SKF bearing man, tells

WHAT DIRT DOES TO BEARINGS

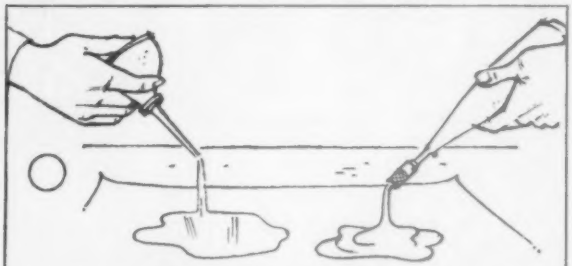
—and how you can help keep it out



LOOK FOR POLISHED, CLEARLY-MARKED BALL OR ROLLER PATHS. They're sure signs that dirt is getting into your bearings, causing lapping of the parts and ultimate failures. To eliminate this problem, follow the steps shown here.

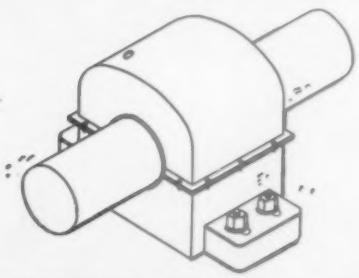


START WITH GOOD "HOUSEKEEPING." Work with clean tools in a clean area. Before you replace a bearing, clean the housing—both inside and out. Always handle a used bearing as carefully as you would handle a new one.



LOOK OVER YOUR LUBRICANTS AND LUBRICATING EQUIPMENT. Dirty oil and grease carry foreign matter with them, right into the bearing. So check them for cleanliness before you use them —and your grease guns and oil cans, too.

IS THE SEAL BENT OR WORN? If it is, dirt and dust and other foreign matter can get into the bearing. If moisture or water is present, you'll need seals made of special moisture-resistant materials.



WHERE DIRT IS A CONTINUAL PROBLEM, try shrouding the bearing housing in a metal box like the one shown here. It's inexpensive, easy to build and helps deflect dust and dirt away from the bearing.

Whenever you're baffled by a bearing problem, consult your Authorized SKF Distributor. His staff of experienced bearing specialists are always ready to serve you—and he stocks all types and sizes of the bearings you need, ready for immediate delivery.

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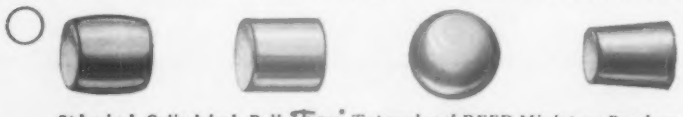

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FACTORY

The Puzzle of the Will to Work

In few areas are plant men so naive as in the realm of incentives—both real and intangible. About few subjects are so many unfounded beliefs so widely held. And yet there are few management concepts today that offer so much promise as the sound application of incentives.

Industrial engineers tend to take the wisdom of wage incentives for granted. Rarely do they quarrel with the principle. If incentives fail, the blame is assigned to a technical failure or procedural omission. If the human element is considered at all, the "union" or the "kind of people we hire today" become the whipping boys.

Personnel people, on the other hand, put all their motivational eggs in one fragile basket. Psychology, they say, provides the answers. Men work for prestige, security, respect, and to be together with others. If a plant manager stumbles, it's not the principle that's wrong. It's his lack of sensitivity to these finer things that failed him.

The great bulk of plant management men tread the incentive path somewhere between engineering science and psychological art. Most typically, the subject is larded far down in the mind once the expected lip service is rendered. Other, more tangible problems seem just as pressing as human ones. So it's small wonder that equipment and machinery get greased so well. That's an easy task. You can see what you've accomplished and what needs to be done.

Confusion, then, and indifference reign. What *are* the facts about incentives? On which basis should you proceed? Simply this: The purpose of all incentives should be to encourage an employee to perform in a predictable and desirable manner.

Incentives are not (in themselves) a method of remuneration. Incentives are not a strategy for kidding people into working harder. Neither are they a collection of data about human performance. And, finally, incentives (motivation if you want to use that term) are not a set of buttons worn on an employee's skin for a supervisor to push when he wants a job done.

Understanding of incentives comes with the realization that people act as they must. Of course, employees are swayed by logic, by money, by opportunity. The engineer's principle of setting work objectives with the aid of measurement techniques is sound, too. The psychological principles of work for the purpose of attaining security, satisfaction, and respect hold true, too. But *none* of the concepts is true for *everybody*. None holds true all of the time.

Effective application of incentives takes patience, knowledge, and dedication. In the long run, only you can determine which techniques, in which combination, will motivate employees in any particular set of circumstances that face you in your plant.

L. R. Bittel

EDITOR-IN-CHIEF

"MANAGED COSTS"—

Small Phrase That Means Big Savings

Despite its apparently elementary definition, a program called "managed costs" is slated to cut *over-all* costs this year at Westinghouse Electric Corporation's Baltimore X-Ray plant.

What are managed costs?

According to the definition, they're costs that can be controlled by a manager. They include expenses created by people, property, and product.

"In short," says L. N. (Les) Albright, manager of X-Ray manufacturing "managed costs means trying to save a buck."

Albright is one of three managers charged with guiding the company-wide managed costs program at Baltimore (one of the smaller Westinghouse plants). The others are John Troughton, plant superintendent, and Richard Sands, manufacturing engineer.

Questioned on their role in managed costs, the trio is quick to emphasize that although they do direct the program, its ultimate success depends on the realization by everyone in the plant, management and labor alike, that cost reduction must be a part of the everyday job.

"To get this program rolling," says Albright, "we had to make sure that everyone in the factory, from top management right down to the janitor, was aware of the fact that a company-wide program to reduce costs was in effect."

IT ALL STARTS WITH OBJECTIVES

The program is simple. It begins and ends with annual objectives.

The beginning starts with corporate objectives. Then corresponding division objectives. Finally, each plant accumulates a set of departmental and plant objectives that fits into the over-all pattern.

Objectives are not broad generalizations. They spell out specific goals—dollars-and-cents reductions for selected items of cost. For example, a Baltimore plant objective for 1960: Cut cost of labor hours and overhead by a definite percentage.

Every supervisor and manager in the plant participates in setting up objectives. Foremen select their targets and the size of the bull's-eyes. Manufacturing manager and division manager okay them when they're satisfied the sights are high enough.

All plant manufacturing objectives *must* fit into the pattern of division and corporate objectives. The manager of the X-Ray division, Jim Delaney, approves objectives set up by plant management. Objectives for 1960 include planned improvements in efficiency, defective work, total expense per net allowed hour, productivity, daywork per cent, cost variances, production commitments missed, and cost reduction projects installed. Objectives cover all aspects of manufacturing.

We said the program begins *and ends* with objectives. The *finis* comes in the form of a monthly report prepared by each foreman, which shows his progress against objectives. Takes him only 15 minutes to compile it from data in regular plant reports.

At the start of each year the plant adopts a new set of objectives, new savings goals.

For a fast look at methods improved by managed costs, read the next five pages.

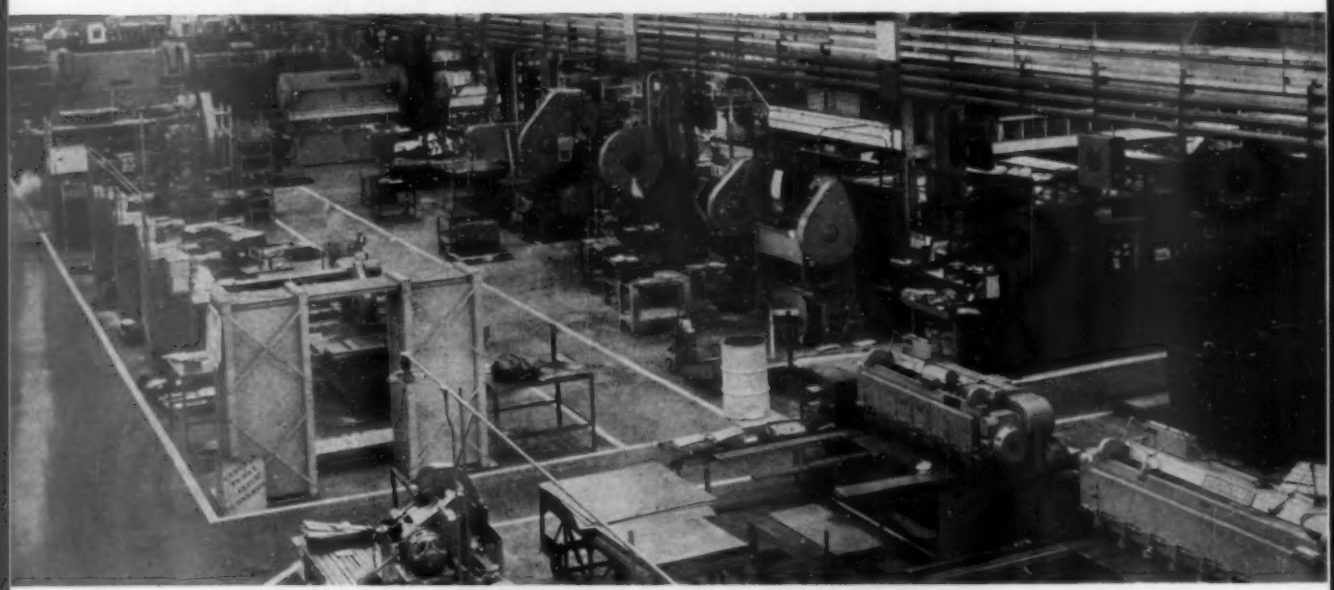
Cost-Keyed 3-D Planning

One of the plant's key tools for cutting product costs is this 3-dimensional floor layout. Keyed model allows managers Albright, Sands, and Troughton (l. to r.) to continually step back from the trees and look at the forest. It's being used to rearrange economically—and rearrange again—the flow of each product through every department in the plant.

Smooth Flowing Stream for Men, Machines, and Materials

A quarter-turn of shears and punch presses changed a rocky brook to a smooth flowing stream. Machines were perpendicular to direction of material flow (from foreground to background). Truckers moved skids of steel sheets in and out of side aisles as well as along the main aisle of this department.

Close scrutiny of the 3-D layout showed the way to relieve congestion, cut material-handling costs. Machines were turned 90 degrees to a new position parallel with material flow. This pre-planned move widened the truckers' path and eliminated side-aisle maneuvering which was time-consuming and slowed down operations.



Turn the page

. . . METHODS IMPROVED BY "MANAGED COSTS"

Cure-All Assembly Line

Assembly line for job shop? Managed costs said yes—got these many benefits: higher productivity, less material handling, lower labor skills, less instruction time, shorter manufacturing cycle, better housekeeping and safety margin, less set-up time per order change.

Integral part of new line is parts bin rack on wheels (left). It's easily moved to open a path for trucking large x-ray bases to assembly line. Without the new bin rack a permanent aisle would be needed, and that would mean lengthening the line, increasing investment.

On the assembly line itself notebook size flipchart (again left) speeds, improves bench assembly. Since x-ray model changes occur more frequently and individual assembly operations are longer than on mass production line only a "whiz kid" could memorize his operation on each of the many models. Now cards are arranged in assembly sequence on ring board. Each book contains illustrated instructions for precise element of assembly operation performed at that station.

Quick-Change Die Truck

Prior to getting this ingenious truck, x-ray dies were handled by crane and manual tugging. Truck has a semi-live base, is moved with a jack handle. Its hydraulic lift is motorized. Extension wire to the motor plugs into any convenient 110-volt line.

Easy-Access Jig Storage

Since drill jigs require little maintenance, Baltimore's managed costs team saw no point to carrying them back and forth between tool crib and drill presses. Now, they're stored at point of use. Costs are cut by making it possible to operate tool cribs on half time.

Labor-Saving Sweeper

Though this floor sweeper is manually operated, it helped cut the plant housekeeping force. Shop isn't large enough to justify a powered sweeper. But with the sweeper one man easily cleans the aisles and open areas of a 100,000-sq.-ft. shop area twice during a shift.

Faster, Safer Gas Supply

Safer manifold system for handling oxygen and argon is result of chain reaction. Started with switch from open arc to shielded arc welding, which brought argon into plant. At the same time plant changed from acetylene to cheaper piped natural gas for flame cutting.

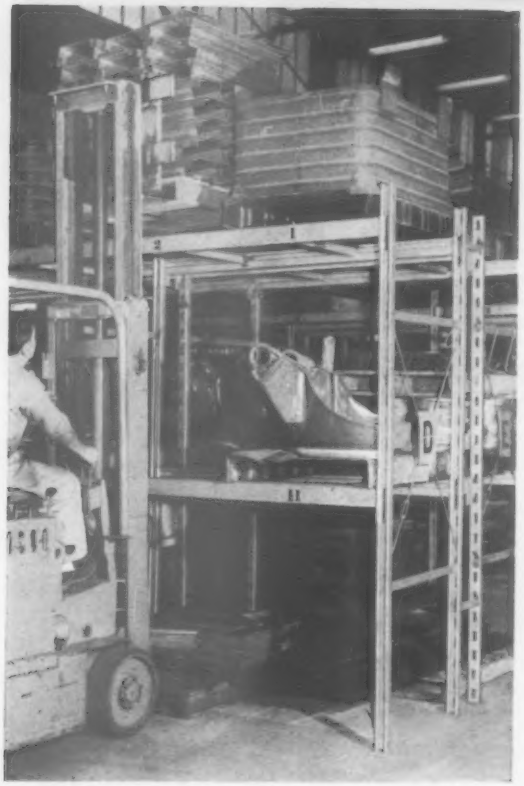
With the new method all gas bottles are kept in this manifold room **outside** manufacturing buildings. Eliminates individual bottle changes by welders and burners. Now changes require only one man-hour per week.

Easy Reel Cable Lift

Idea for this cable reel lift was borrowed from auto bumper jack. Before Foreman Lonnie McLesky came up with this time and labor saver, reels were hand-rolled up and onto a steel skid. Now operator just rolls a reel into position between the lugs of the two lifts, positions lugs under a shaft through the reel, raises the reel by turning the two screws. Reel turns freely on the shaft as cable is pulled off onto the processing bench (background).

Turn the page

. . METHODS IMPROVED BY "MANAGED COSTS"



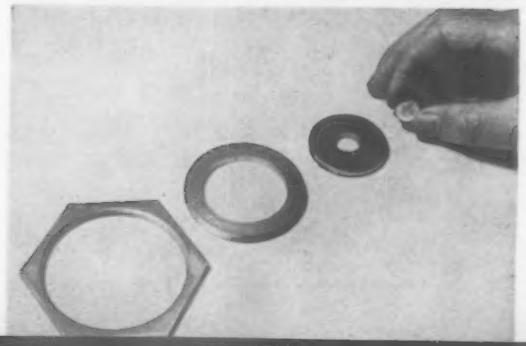
Space-Saving Racks

Storage racks for jobs in progress not only save space at the Baltimore plant. They also eliminate "lost" orders and materials; allow cleaner, less hazardous housekeeping; reduce handling; spark higher welding productivity.

Racks take materials off the floor, transform arrangements from haphazard clutter to orderly geometry. Location of materials is shown by aisle (letter) and recess (number).

Paper-Chopping Exposé

Manufacturing engineer Sands has taped to three walls of his office-laboratory samples of all the paper forms and reports used in the Baltimore plant. It had a dramatic effect—just what Sands hoped for. When manufacturing manager Albright saw the strange wallpaper he exploded. Bold, red crosses began to appear on some of the forms, indicating that they have been eliminated altogether or combined with another form or report. Result of this "bull-by-the-horns" action: paperwork to date shows a healthy reduction of 33%.



Cost-Cutting Metal Part

Old method produced each part individually. For example, largest (cable nut) was cut from aluminum tubing. Each 100 pounds of metal made 110 sets of parts. New way stamps parts from sheet metal—smaller from slugs of larger. Yield: 170 sets per 100 pounds.

More methods improved by "managed costs"—

THIS TIME IN TERMS OF COLD, HARD CASH

WORK-AS-WELL FREEHANDS

Freehand shop drawings save engineering man-hours. Generally, formal engineering drawings aren't needed. Freehand sketches serve the purpose, are made more quickly. **Savings: more than $10,000 per year.**

"DOCTOR'S OFFICE" TOOL CRIB

Tool crib service has "doctor's office-hours" schedule. It's open from 7 to 9 a.m., 11:30 a.m. to 1 p.m., and 3 to 3:30 p.m. Attendant grinds and repairs tools without interruption during closed hours. In addition, attendant can keep three tool grinders going at one time. This change moved one man out of the tool crib to another assignment. **Savings: $6700 per year.**

FASTER-MOVING TRASH COLLECTION

Better handling cut trash collection costs. Special design makes a quick-handling team of floor and highway trash collection trucks, wheels them to shipping dock. Hoist on highway truck lifts floor truck, dumps contents into truck. This, along with a manual floor sweeper (page 85), helped cut force of janitors. **Savings: over $10,000 per year.**

GRAVITIZED INSPECTION TRIP

Handling from receiving inspection to stores is as easy as rolling off a log. When an inspector okays a lot he puts it on a gravity conveyor that wheels the parts into stores. Parts can wait on the conveyor until a clerk checks and puts them into stock. **Savings: $6000 per year.**

EXTRA-VERSATILE CRANEMAN

One crane operator's job is always light. When he isn't needed to run the crane he has other assignments including: start equipment (e.g., ovens, plating) ahead of shift start-up; operate air conditioning unit; perform run-in tests of speed reducers for incoming inspection; repair small tools; maintain truck storage batteries. This combination provides the man with a fair day's work. **Savings: $3000 per year.**

DISAPPEARING MACHINE TOOLS

Survey of machine tools revealed a number of machines were not needed. Elimination of these and other excess machines really cut costs. **Savings: $200,000.**

ECONOMIZED CHAIN OF COMMAND

In the Baltimore plant the heads of purchasing and customer service report direct to the manufacturing manager. There's no "buck passing." But, more important, this has permitted reduction of staffs and elimination of some paperwork by combining functions. **Savings: over $35,000 per year.**

TELEGRAPHIC HEATING BOILERS

Installation of A.D.T. (American District Telegraph) on oil-fired, low-pressure boilers (for heating) reduced the need for steam engineers from 4 to 1. **Savings: over $18,000 per year.**

TEST YOUR M.M.Q.*

*manager-mouse quotient

The red carpet that industry rolls out for real managers is for men who are not afraid to stand on another kind of carpet to back their decisions.

So, if you've got the notion that somehow the word *management* means shared responsibility—that a manager thus can shy away from personal responsibility for the successful execution of his assignment—you couldn't be more wrong. If that's the way you think, no red-carpet treatment for you.

Today's manager must be a manager, not a mouse. He must seek out responsibility and accept it. The extent to which he is willing and able to do this is a quick but sure measure of his competency.

While nobody argues with the maxim that response always meets challenge—that men grow in jobs because they have to grow—don't fool yourself with success slogans. You can't rely on them. When the task gets hard, some men run out—take a powder. And many of those who do achieve success admit that success is not worth the ulcer. Some of them step down at the peak of their careers to less demanding assignments, perhaps on college campuses.

TAKE A LOOK AT YOURSELF

Managing is your job. It's important for you to know exactly how well qualified you are to hold that job—how badly you want to move up to more responsible positions where the pressures are higher, the risks greater. You must know your limitations—and your potential. In the final analysis, you're the only one who can really measure yourself.

What, then, are the qualities and skills that spell management leadership? They are planning, communicating, and courage. Can you measure yourself against these qualities and skills? Yes. By taking the tests that accompany this article, then rating yourself according to your score.

Take the three qualities and skills one by one:

1. Planning—This comes high on the roster.

"The man who can't plan can't manage," says the president of one large American company. "The very act of planning widens the executive horizon. For this reason the responsibility for planning should be forced down the line to the first-line supervisor."

Your skill at planning is the basic indicator to your talent as a manager. It is a direct reflection of your job knowledge. The operation of your department is the tip-off on your planning ability. If your subordinates know what you expect of them—if their time is efficiently utilized—if you can delegate smoothly and efficiently—if you can take emergencies in your stride because you have allowed for them—then your planning is flexible and imaginative.

By JAMES M. BLACK, Princeton, N.J.

2. Communications—If you can't put your thoughts into words (or if you don't think it's worth the trouble to do so) you're a short circuit in your company's communications system. No matter how well you know your job, no matter how carefully you've planned an operation—if you can't or won't explain how you want it done, you'll probably fall short of your objective. Subordinates won't know what to do.

"Poor staff work is one of the greatest hidden costs of management," says the executive vice president of a heavy-machinery company. "We spend too much time and money correcting mistakes that occur because somebody forgets to pass the word, or because somebody doesn't quite understand it when it comes."

Furthermore, if you're slipshod in your communications, you are letting your boss down.

"Why is it I have to cross-examine an assistant to find out what's going on in my own department?" is a common industrial complaint.

You have the initiative in upward communications, although it's more difficult to "speak up" than it is to "talk down." If you keep your superior up to date on your activities and if you express your opinion frankly and honestly when it is asked, you're acting like a manager, a professional. (Naturally, this doesn't mean you are supposed to talk to him endlessly every time you get the chance.)

3. Courage—With ability in planning and communicating at your command, you need one more quality to break the sound barrier and reach the rarefied atmosphere of top-management responsibility. This is moral courage—the vital ingredient that separates manager from mouse.

General George B. McClellan was known as America's Napoleon in the early days of the Civil War. He was a brilliant planner and organizer. He was also an able communicator.

McClellan, like some would-be plant managers, lacked just one thing: the ability to face the showdown—the will to commit his troops to offensive action when the chips were down. Eventually he was replaced.

The courage to make decisions when you are the man on the spot, and the confidence to carry them out, is a requisite of management. An executive can't stand with his bat on his shoulder waiting for chance to throw him "a fat one across the middle." Sometimes he has to swing at the hard ones.

TEST YOURSELF

Are you acting like a manager? The tests opposite and on the following page will tell you. Answer the questions frankly—nobody's looking, and you're keeping score. You won't make a perfect score. But if you know where you're "near missing," you can adjust your sights and smack the bull's-eye next time.

TEST 1: PLANNING

Here are 10 ordinary planning situations with three alternatives for dealing with each. Check the box following each statement that best describes how you handle your job. Score yourself 10 points each time you check Statement (a); 5 points for (b); 3 points for (c). If you get 90 or above, you're either on top of planning or fooling yourself. If below, your job has you on the defensive.

1 (a) I have my assignment under finger-tip control. When my boss asks questions I'm ready with accurate and positive answers. ☐

(b) Most of the time I know the answer. But I don't like to stick my neck out, so I qualify my replies until I can check. ☐

(c) Somehow I'm always running hard just to stay even. Almost always I have to go find the answer before I can give it. ☐

2 (a) When I attend a department conference I make sure I understand the problem involved even if it is not directly related to my work. I'm prepared to make suggestions to help in over-all planning. If I think my idea is helpful I recommend it whether or not I'm directly concerned. ☐

(b) I keep quiet unless I'm asked a direct question. I don't want to butt in. ☐

(c) I sit and, sometimes, listen. Why worry over other people's plans? I have enough troubles of my own. ☐

3 (a) When I'm given a new assignment I plan exactly how to do it. I tell employees just what they're supposed to do and how. ☐

(b) Sometimes a new job throws me off stride. I rely on my superior to help me plan it. ☐

(c) It's hard enough carrying out the routine. When something different comes along, my boss complains about overtime, idle time, and schedule failures. But it's his job to plan, not mine. ☐

4 (a) I know how to handle emergencies. I plan my work so they seldom occur. By looking ahead and anticipating difficulties I leave myself plenty of room for maneuvering. When the unexpected happens I can deal with it. ☐

(b) I leave most of the planning to my superior, do my best to carry out his orders. If things go wrong, it's not my fault. ☐

(c) Emergencies are usual with me. But I'm not to blame. It's the boss's job to see that I have the manpower for the work. ☐

5 (a) I give myself deadlines to accomplish projects. When given an assignment I set a time limit. I seldom fail to meet it. ☐

(b) I usually ask the boss when he wants the job finished. If he doesn't set a time, I don't. I fit the work in as I can. ☐

(c) Deadlines! I never think about them unless the work is rush. Then I let everything else go to do it. ☐

6 (a) I plan my work flexibly so I can undertake special or emergency jobs without upsetting my regular activities. With foresight in planning I can accept an additional assignment without throwing my regular schedule out of kilter. ☐

(b) I'm usually able to get the job done. But it takes overtime and extra work if it's unexpected. ☐

(c) When extra duties come my way it's up to the boss to decide what I'm to do. I just work here. ☐

7 (a) I know my superior bases much of his planning on the information I give him. I keep him informed. ☐

(b) I never know exactly what information the boss wants. I sometimes slip in keeping him filled in. ☐

(c) Why should I tell the boss what's going on? He should know. He gives the orders.. Let him ask. ☐

8 (a) I am familiar with the skills and abilities of my subordinates and can accurately estimate if a particular man can do a job and how long it will take. I plan to have the right man in the right spot. ☐

(b) Sometimes I have to pull a man off one job and switch him to another because my original selection was poor. ☐

(c) I work with what I have. Often I find employees idle on one job, rushed on another. ☐

9 (a) My employees are an efficiently trained and confident working team. When I give an assignment to a subordinate I am confident it will be done without much checking from me. ☐

(b) I supervise closely. I want to make sure there are no mistakes. This keeps me bogged down in detail. ☐

(c) I seldom get around to training. Too busy correcting errors. I'm a "do-it-myself" manager. ☐

10 (a) I constantly ask myself, "Is the present method of doing a job the right one? Would better planning raise productivity?" ☐

(b) I realize it is my responsibility to plan, but usually I stick to old methods because I don't have time to experiment. ☐

(c) Why bother planning a new approach? The old way is good enough. Besides, I know it. ☐

Turn the page

TEST 2: COMMUNICATIONS

Here are eight statements about attitudes in communicating upward. Take each statement in turn, apply it to yourself, check the square that tells whether it's true or false. Count up your "false" checks. If you've got eight, you're perfect. With seven marked "false," you'll do just so-so as a manager. Anything less than seven "falses," and you'll soon find yourself in real trouble.

	TRUE	FALSE
1. I build a fence around my boss. I'm a one-man protective agency, guarding him against bad news. I'm a censor of upward communications. I shield him from the facts he needs for making decisions.	☐	☐
2. I protect myself. I head off trouble by keeping quiet about it. I don't tell my boss about my mistakes. I "play down" facts because I know their disclosure makes me look bad.	☐	☐
3. I'm afraid to communicate. "Never volunteer" is my slogan. I'd rather be safe than sorry. If I tell my superior about a complication, he may give me the job of straightening it out. This may mean extra work.	☐	☐
4. I let other people push communications up. It's not my job to keep the boss informed. Let others worry about that. If he wants information, let him ask for it.	☐	☐
5. I'm not responsible, so I keep quiet. Sure, I see how a job method can be improved—an operation made more efficient. But I'm not directly concerned, and so I won't tell my superior. It's up to him to put recommendations before the right people.	☐	☐
6. I'm my own press agent. Upward communications is a chance for me to "blow my own horn." If I give myself a promotional boost every time I make a report, maybe the boss will think I'm as good as I think I am. Why bother about facts?	☐	☐
7. I always speak right up. Doesn't matter whether I know the facts. If a job is almost finished, I might as well tell him it is finished. He won't act for a while anyhow—and by the time he does act, the job will be finished.	☐	☐
8. I always slant the news. Usually I slant it to the positive—emphasize the good things, gloss over the bad.	☐	☐

TEST 3: COURAGE

If you check yes to Nos. 1, 2, 4, 6, 7, 12, 15 below, you have the temperament of a leader—independent, ambitious, analytical, sure of yourself. If you answer yes to 1, 3, 5, 8, 9, 10, 11, 13, 14, you may be a topnotch administrator or a valuable subordinate. But you don't want "make or break" authority. It's not worth the ulcer that goes with it.

	YES	NO
1. I can analyze a complicated problem and explain it in an orderly, logical way.	☐	☐
2. I like a difficult assignment, enjoy the "big" challenge, and am confident I can meet it.	☐	☐
3. I'm all right on routine decisions. But when risk is involved, I ask my superior to review my plans first.	☐	☐
4. I go for the hard jobs nobody else wants. If I do them well, it adds to my reputation.	☐	☐
5. I work best when I have my boss's approval. If he criticizes me, I'm upset, worried, and efficiency falls off.	☐	☐
6. I'm not afraid of responsibility, and diplomatically try to widen mine by acting on my initiative whenever possible.	☐	☐
7. When there are several different ways of doing a job, I have no hesitation in picking one. Usually it is right.	☐	☐
8. I like living by a schedule. I want my boss to lay out my responsibilities, and I stay strictly within them.	☐	☐
9. I'm a bug on details. Once given a job, I carry it through to the letter. I never do more or less than I'm asked.	☐	☐
10. I like to complete a job once I get it. Two or three simultaneous assignments confuse me. I'm no juggler.	☐	☐
11. I dislike delegating, am confident only when I'm doing the job myself.	☐	☐
12. I hate details. Give me the big problems. I'll figure out how to solve them and delegate the routine.	☐	☐
13. Argue with my superior? Not I! He's responsible. Besides, he may get mad if I oppose him.	☐	☐
14. My subordinates respect me, but they know I'm the "middle man," just passing along the orders.	☐	☐
15. I'm willing to take the rap when things go wrong. I want credit for success, so I accept responsibility for failure.	☐	☐

Short Schedules Stretch Output of Maintenance Men

Can you optimize the size of your maintenance force? Yes. It's been done at Wallace & Tiernan (Belleville, N.J.). The company now operates with a just-right maintenance force. It has enough men, yet is sure the department is not overstaffed. What's more, the system gives management clear evidence when more manpower is needed, or when the force should be cut.

The secret behind all this: a new kind of job scheduling that anybody can do. Called Short Interval Scheduling (SIS) the new technique is saving money for Wallace & Tiernan (W&T) every day. Cost of installation was recovered within a few months. The 62-man maintenance force was trimmed down to 39—a whopping 37% reduction. Recently, when some post-recession orders called for a production increase, the maintenance force was increased to handle the enlarged job. Maintenance got the additional six men without an argument from higher management. Why? Because SIS had made the need clear enough. Management couldn't argue that the workload hadn't increased.

HOW SIS WORKS

Back in June 1958, W&T called in The Alexander Proudfoot Company (Chicago) as consultant. The assignment: Help trim fat from the maintenance staff, without cutting into the work done. Proudfoot told W&T that job scheduling—traditionally said to be tough for maintenance—could cut the force by at least one-fourth without cutting productive activity. But it had to be Short Interval Scheduling.

SIS works, in principle, like other scheduling. You estimate time for each job by adding the components. Then you schedule the job according to the estimated time. But the work is assigned bit by bit (ideally by single man-hours) rather than as one complete task.

Thomas B. Walker, manager of manufacturing services, puts it this way: "An athlete running the mile must pace himself or he'll be a victim of his natural tendency to take the first quarter mile too fast, run progressively slower, then be out of steam in the last quarter. The same thing happens in the plant. People left to their own planning work at only about half their top efficiency. Alone, they follow their natural inclination to reach for the easy job. Unless they have a series of short-term goals, they'll set their own pace."

SIS gives people these short-term goals. An electrician, for example, isn't assigned a three-day job of installing a new lighting system. Instead, he gets smaller assignments, such as running conduit or hanging fixtures. This way, he can visualize his immediate goals. He escapes the fate of the unpaced miler.

At first glance, you'd think such a plan would be a

Plant Manager Donald N. Hale finds that short interval scheduling is a big help in controlling maintenance output and backlog. It improves supervision, too. As foremen gain skill at estimating time for jobs, they are better equipped for assigning work.

Manager of Manufacturing Services Thomas B. Walker sees goal setting as the key to success of scheduling. Says he: "Any goal is better than none. And reasonably immediate goals are more effective than distant ones. They're less discouraging."

Foremen, like Electrical Foreman A. S. Eberhardt, aren't saddled with volumes of paperwork. Eberhardt makes up next day's schedule for men of his crew every evening before he goes home. Next morning there's no lull. Every man has his job assignment.

Craftsmen do not work harder with scheduling. Electrician John Skiptunis feels that it actually makes maintenance men's work easier. Better productivity results from less lost time between jobs.

real headache—just one more paper-shuffling monstrosity to keep in operation. But take a look at the facts. Installation of SIS requires:

- No shake-up in your organization.
- No continuing time studies (not even a stopwatch).
- No change in work methods.
- No speed-up. Men work at their customary average pace. But they keep plugging along at that pace like the proverbial tortoise that won the race.

"The plan works so quietly it's easy to forget you have anything out of the ordinary," says Walker. "In fact, this smoothness begets a minor difficulty. Our only problem is making foremen stick with the plan. They tend to get lax. They often can't believe that huge savings result from such simple scheduling.

And there are more benefits from SIS. Here are five:

1. Because SIS tells only when—and not how—to do a job, it doesn't rely on better methods, better planning, or work simplification for success. (With these you'll get even more gravy.)
2. It encourages better supervision.
3. It boosts productivity of maintenance men by reducing idle time.
4. It helps get important work done first.
5. It gives management weekly reports for control of maintenance manpower.

HOW TO SET UP SIS

Three preliminary steps are required to set up SIS:

Step 1. Determine the workload—W&T uses three forms to record all incoming work: One is a simple Maintenance Work Order, familiar to almost any maintenance manager. This form is initiated by a project engineer (through a requisition) or by the maintenance superintendent. It covers non-routine items that require more than one man-hour of work. Such jobs average about 70% of the total workload.

A second form, called a Trouble Ticket, is for emergency jobs. It catches the small jobs (usually an hour or less) that stop essential production, such as burned-out fuses, or small motor replacement. Tickets originate in the maintenance office as a result of a phone call. They make up about 120 man-hours per week, roughly 15% of the total workload.

The third—and perhaps most important—form is used to list the elements of any job to be done more than once. Called a Maintenance Operations Sheet, it describes the work, its location and frequency, specific operations to be done, tools and materials needed.

"At W&T it covers any job we expect to do more than once," says Walker. "Many of these jobs are preventive maintenance." W&T has 237 Maintenance Operations Sheets to cover such jobs. Routine maintenance has top priority, comprises about 15% of the workload. It's the backbone of W&T's maintenance program.

W&T used these three forms before Proudfoot stepped in, but never kept a backlog of total workload. Proudfoot measured the workload by channeling it through the maintenance office where every job was logged. This required the part-time services of one clerk, the only extra time required for SIS. Work handled by all three forms was, over a period of time, a reliable gage of the total workload.

Step 2. Calculate man-hour requirements—Now, how are the craft man-hour requirements calculated? Proudfoot men summarized them for W&T in three months. They dug into historical records on the routine jobs, found total job times. They checked every non-routine job to develop proficiency in estimating by foremen, superintendent, and project engineers.

Usually, W&T experience or Proudfoot know-how indicated just how much time the short jobs or segments of any big job should take. Often, Proudfoot engineers asked the man on the job what he considered a fair time limit. There was no attempt at a speed-up, simply an effort to decide on the normal time needed to do a short job properly.

Thus, every job was translated into man-hours that represented a realistic goal, already proved by W&T experience. By adding them up and balancing to avoid peaks and valleys, W&T arrived at a fair estimate, by craft, of weekly man-hours needed to do the whole maintenance job.

Step 3. Determine workforce size—How many mechanics do you need? The answer is now easy to get. You know the current workload and the time needed to get the work done. You simply divide the weekly man-hour total by 40 hours to get the number of men you need for each craft's workload.

HOW SIS WORKS IN PRACTICE

Let's assume a conveyor has to be rebuilt. The shipping foreman makes out a requisition, sends it to the maintenance department. There, the maintenance superintendent makes up a maintenance order, using one or more forms as needed for craft reasons. Either he or the craft foreman estimates the job, enters it on each order. Job priorities are established at a meeting held every day. At one of these meetings the conveyor rebuild job gets a priority, and is scheduled.

When the job is scheduled, the foreman assigns parts of it to craftsmen, using the daily schedule form. Every job is broken down into "bits," never to exceed 8 hours. (If the job is a "shop" job, it may be broken down into one-hour bits without undue strain on the foreman. But scattered maintenance jobs are often scheduled for a full 8 hours, with an oral agreement as to how much work the craftsman should be able to complete during two- or three-hour intervals during the day. The foreman returns to check progress at those intervals.) Where craft coordination is essential, men are always scheduled to the exact time.

What assurance is there that the job estimates are accurate? "Any goal is better than no goal," says Walker. The over-all estimate may be wrong on a big job—such as a 100 man-hour project—but the estimates for the short, scheduled bits of work are much more accurate. And the accuracy with which a foreman can estimate a job improves with practice. Before too many months have passed, there's a precedent for almost any job. Thus the system gains accuracy with age.

What happens if a craftsman doesn't finish a job

according to the schedule? The foreman enters the actual time in the appropriate column on the daily schedule form, reschedules that job and those following. Let's assume a job (with a standard of two hours) was scheduled from 2:30 to 4:30 p.m. If at 4:30 the foreman decides only 1½ hours work is completed, he changes the standard to 1½ hours for the completed portion of the work, enters two hours (actual elapsed time) in the "actual hours" column. The remaining work is separately rescheduled. If the original estimate still seems right, it's rescheduled as a ½-hour job.

At the close of each day, each foreman sends his schedule sheet and trouble tickets to the maintenance office. The superintendent studies the schedule sheets. The clerk computes the standard and actual times for entry at bottom of the daily schedule (top form, below).

Weekly, the clerk composes a tally of performance, based on the daily schedules. He prepares a Weekly Status Report (bottom form below). The report is sent to the plant manager (to whom maintenance reports), who uses it to analyze the workload, the backlog of work, and the efficiency of the maintenance force.

DAILY SCHEDULE

WALLACE & TIERNAN INC.

DATE 3/10/59 DEPARTMENT ELECTRICAL (Eberhardt, foreman)

NAME	Work Orders: Clock Time	Order No.	Actual Hours	Standard Hours	Routines: Clock Time	Routine No.	Actual Hours	Standard Hours	Troubles: Clock Time	Job	Actual Hours	Standard Hours	Individual Performance: Act	Std.	%
Ackerman	3:30/4:30	1392	1	1	8:00/9:30	E-10	7	6					8	7	88
Buckley					11:15/3:15	E-64	3½	3	8:00/11:15		3¼	–	3½	3	85
									3:15/4:30			–			
Gibbs	8:00/9:30	1022	5	4½									8	7	88
	11:30/2:30	1260	3	2¾											
Wishert	11:00/12:30	1592	1½	1	8:00/9:00		3	3					4½	4	89
									1:00/4:30		3½	–			
TOTALS			37½	33¾			13½	12			13		64	–	–

Daily scheduling is aided by this special form. Before the end of each work day, each foreman originates a form for the next day. The three column headings here—Work Orders, Routines, Troubles—refer to whether the job was originated on a maintenance work order, a maintenance operation sheet, or a trouble ticket.

Electrician Bucholz, for example, was scheduled from 8 to 11:15 based on a trouble ticket; from 11:15 to 3:15 based on routine; then again from 3:15 to 4:30 on a trouble ticket.

Under the column heading "Actual Hours," the foreman records the actual time taken to do each job. Jobs originated on trouble tickets are not estimated in advance, as are other jobs.

The bottom line, headed "Totals," gives a picture of efficiency of work done on work orders and routines. Efficiency of work done on trouble tickets is not computed, because estimates aren't made in advance. Trouble tickets are informally checked.

The last column, "Individual Performance," can be used to evaluate craftsmen. W&T doesn't use this.

Weekly control is a valuable part of the payoff from SIS. This Weekly Status Report is based directly on the daily schedules. It's sent to the plant manager, tells the performance of the various craft groups at a glance.

Since routine work and trouble tickets get priority, the most critical line is B5 (backlog to date) under Work Orders. It shows how backlog is changing in each craft group. It's the signal for increase or decrease of manpower. In this example, backlog is holding steady for each craft—a sign the workforce is about right size.

Line B5 isn't the only important line on the report, of course. Lines A4 and B4 give the manager a report on efficiency of crews. Lines A1, B1, and C1 show the workload increase or decrease during the week.

MAINTENANCE DEPARTMENT WEEKLY STATUS REPORT

WEEK OF September 6, 1959

ACTIVITY	Electrical: This Week	Electrical: Last Week	Millwrights Pipefitters: This Week	Millwrights Pipefitters: Last Week	Carpenters Painters: This Week	Carpenters Painters: Last Week	Porters: This Week	Porters: Last Week
A. ROUTINES:								
1. Scheduled hours	38	42½	56	59	–	–	497½	521½
2. Hours assigned	38	42½	48	58	–	–	487	510½
3. Hours completed	43	45	51	66	–	–	487	515
4. Performance (%)	88.0%	94.4%	94.1%	87.3%	–	–	100%	99%
5. Backlog to date	0	2½	8	1	–	–	10½	11
B. WORK ORDERS:								
1. Rec'd and on hand	1829	2015	1259	1308½	1078	1000¼	112½	115
2. Hours assigned	244½	266¼	183	227¼	165	191½	20½	18
3. Hours completed	276¼	299½	199	246½	189½	218¾	20	18
4. Performance (%)	88.4%	88.9%	92%	92.3%	87.1%	87.3%	102.3%	100%
5. Backlog to date	1568¼	1721	1056	1105	927	773½	92	97
C. TROUBLE TICKETS:								
1. Hours allowed	120	120						
2. Hours used	152½	164½						
3. % to allowance	127%	137%						
D. MAN HOURS:								
1. Man hours avail.	374½	404½	305	372½	232	263¾	507	533
2. Vac. and Absent hrs	80	40	40	49¼	40	40¼	105	88

NOTE: 58 BACKLOG TO DATE INCLUDES 1200 HRS OF FUTURE WORK

THE COMING MARVELS IN BUILDING MATERIALS

By CHARLES H. TOPPING, Senior Architectural and Civil Consultant, Engineering Department, E. I. du Pont de Nemours & Company, Wilmington, Del.

Designing a new building? Or facing a nagging problem of continual repair of roof, sidewall, or other building component?

If so, you're in the same maze with everybody else in charge of plant structures.

So you keep looking for an out—for the best material, the perfect design. What you really need, you say to yourself, is a guide to building science. Something that will tell you how long the material will stand up. Or that will suggest what design will do a better job.

Unfortunately, there's no such guide available right now.

The Building Research Institute of The National Academy of Sciences recently realized the need for a guide of this type. It has now set up a long-range program to document vital data. But it will take a long time to compile this information into a reliable reference.

In the meantime, the designer and the maintenance manager still have to resort to a choice between two alternatives:

(1) Play it safe by sticking with the "old reliable" materials and designs, or

(2) Test and evaluate the likeliest new ideas.

With the first choice you may be missing out on something better. With the second choice you may spend (and risk) valuable time and considerable money.

Over the years, the Engineering Department of Du Pont has had the unique opportunity of examining the results of experimentation with many new building materials and methods. They were tried under various conditions presented in our 78 plants operating in the climates of 28 states.

On the average, we find Du Pont buildings have six problem areas more troublesome than others. The following discussion covers some of the new techniques and materials that have given or shown promise of improved economies and performance in these six areas: protective coatings, roofs, floors, windows, doors, and walls and partitions.

(Editor's note: The author, Mr. Topping, is a Du Pont engineer. Naturally, he mentions some Du Pont products in this article. Readers will observe that he mentions other products as well.)

PROTECTIVE COATINGS

For some years now our department at Du Pont has had a protective coatings committee to assemble, check, and digest information sent to it by various Du Pont plants. It also conducts independent research and development on new materials and techniques. Use of this new knowledge by our plants has improved plant maintenance and cut costs dramatically. For instance, cost of maintenance painting dropped from just under 0.5% of capital investment in 1951 to just over 0.25% in 1958.

Spraying—Among the proven techniques checked out by our committee and now in general use are hot-spray painting and "Fog-less" air caps for conventional paint spraying. With hot spraying we can apply a heavier paint film, because heat temporarily reduces viscosity of paint. "Fog-less" is the trade name for an air cap (Gladon Corporation) that encloses the atomized paint within an air envelope. This substantially reduces over-spray and provides higher film build per pass.

Preparing surfaces—Everybody knows that quality of surface preparation affects the quality of finished protective coatings. Most methods are messy and expensive—and so are usually not done properly. Few will question that sandblasting provides the best surface preparation for paint on bare metal. It is not so well known that sandblasting is the most economical method if you're well organized and have complete equipment ready for the job. And that it is also more economical for in-between measures where you can safely leave areas of well-adhered undercoat in place.

Roller coating—Lots of people spurn this as an amateur's way. But it's really an economical and satisfactory method of applying paint on many types of industrial surfaces where the area is not badly broken up by projections, holes, and trim.

Aside from the work of the committee (described above), Du Pont gathered other data on protective coatings, as follows:

Galvanizing—A number of our plants have found that galvanizing structural steel, although somewhat costlier initially, is so satisfactory in the long run that the economy is not in doubt. But don't try it in acid or alkali areas, where galvanizing will not stand up.

Painting over galvanized surfaces has long been a problem. In time the coating flakes and peels. The zinc unites with drying-oil acids of the paint vehicle and forms a greasy soap that breaks the bond between zinc and paint film. You can overcome this by introducing a zinc powder in the paint. The acids will react with the powder before they attack the zinc on the galvanized surface.

Acrylics—Occasionally comes a dramatic breakthrough in coatings. Such a breakthrough is the new series of "Lucite" acrylic finishes. These spring from a family of plastics that has one of the longest life expectancies in weather exposure.

On new wood, Lucite acrylic emulsions show over 50% more durability than the best of other types of paint. Correctly applied and with the proper primer, they overcome blistering and checking (commonest paint failures) caused by differential expansion between spring and summer wood. Lucite eliminates these two failures. That is why its future looks bright indeed. Perhaps there will be even more uses for these paints on masonry and other surfaces. These topcoats, being emulsions, have high moisture permeability, apply easily, dry quickly.

Waterproofing—New coatings for waterproofing and decorating masonry walls are providing some interesting developments today. For some years polyvinyl-acetate emulsions have been compounded into durable waterproofing coatings. They can be tinted and are alkali-resistant and economical. Paints based on Hypalon synthetic rubber are also giving satisfactory service. Being impermeable, they should not be used on the outside of walls without proper ventilation. Polyvinyl acetate paints, however, are vapor-permeable.

Wall coatings—Other thixotropic paints (thin out with brushing) or high-build paints are available for special uses. One type is used to decorate masonry partitions and interior faces of masonry walls. Of heavy consistency, it fills surface voids in concrete block and thereby upgrades both appearance and soil retardancy.

Another type, soon to show up on the market, will eliminate need for spackling and sanding joints in dry-wall construction. Taping joints may still be useful, but operations will be greatly simplified and the usual three-day delay for drying will be reduced to one. You'll spray the paint over the wall in a single coat thick enough to hide joints. This will improve office and other partitions of stud and gypsum board-wall design. Right now these partitions are economical and serviceable. With this new high-build paint they can also be erected and finished quickly.

Multicolor paint (spattered effect) is another new type of heavy paint for walls. It is most often used in housing, but harder grades of gloss and semi-gloss are now serving well in industrial buildings and laboratories. The multicolor effect tends to hide soil. You can pick a surface gloss that is easy to clean.

Longer-life outdoor coatings—If you are looking for a unique new protective and decorative film that promises a 20-year outdoor weatherable life, keep your ear tuned for "Teslar" polyvinyl-fluoride (PVF) film. It's being tested in industrial buildings as a weatherable, decorative finish for sheet steel and aluminum siding and panels, and for roll-formed trim shapes. It offers clear, weatherable finish for natural wood. In pigmented form it will be used for hardboards, chipboards, and wood fiberboards. It can serve as a stain- and dirt-resistant surface for rigid and flexible plastics.

Wear characteristics of Teslar are excellent as a surface layer on rigid substrates. Gloss retention during outdoor exposure is high. It may cost more than conventional lacquers and enamels, but it will cost much less than porcelainized or anodized finishes.

Another new durable covering material consists of fine-grained aggregate, ready-mixed with a liquid binder of methyl methacrylate. It makes a paste that can be troweled onto exterior surfaces such as con-

crete block or cast or natural stonework that has disintegrated. Life expectancy seems high.

Newest in coatings—Coatings based on entirely new concepts are coming on the market. Solventless paints, for example, promise to provide a heavy film thickness in one coating without the problem of surface drying before the under part of the film dries.

New coatings made of neoprene and Hypalon synthetic rubber are now coming into their own. They provide high resistance to acids and alkalies, and particularly to solvents, oils, and greases. If compounded right, they weather better than most synthetic organic materials. Neoprene wire and cable covering has been used in exterior locations for 25 years without significant loss of properties. Hypalon has been around for only 7 to 8 years. But laboratory tests show it resists ultraviolet light better than neoprene. Granted, it now costs about 40% more than neoprene. But its almost complete resistance to ozone makes it a likely candidate for a champion outdoor material. It is impermeable, however, and therefore should not be used on a wall that needs to breathe.

Like many other companies, Du Pont finds that epoxies reinforced with glass fiber provide a satisfactory though costly method of protecting structural parts of corrodible materials—for instance, supports for glass fiber-reinforced plastic vessels.

ROOFS

About five years ago Du Pont decided that it had suffered long enough with premature failures of bituminous roofing on flat, dead-level roofs. A study resulted in a series of changes that have almost eliminated the worst of our roofing troubles.

A survey showed that Du Pont's annual maintenance cost for insulated roofs had been $1.54 per 100 square feet. Blistering accounted for 25% of roof failures. Flashing failures ran slightly less. Traffic and abuse, and inadequacies in design and construction accounted for almost all the rest.

The key to roof blistering came out in a study by Warren Warden, asphalt consultant. He proved that the better built a bituminous roof is, from the standpoint of insulation, the more likely it is that blisters will develop. This posed a dilemma: We had to build good roofs for long life—yet if we built them too well they would surely fail.

Vapor barriers—Warden's study (just published by Building Research Institute) showed the best thing is to eliminate vapor barriers. Further examination brought out that in most cases the need for a vapor barrier was overemphasized. For example, it wasn't needed for average conditions south of a latitude passing through Baltimore or Cincinnati and east of the Rockies, as typified by an office with average temperatures or with air conditioning, or by a warehouse or factory using dry operations. Here, enough moisture condensation in roof insulation to impair its value is unlikely. If the insulation can breathe freely, moisture will condense in the insulation in cold weather and heat will drive it out in warm weather. One way to permit breathing is to install insulation over fluted steel decks, and ventilate the flutes. Another way is to use an insulating roof deck—for example, one that's made with wood shreds cemented together.

If the plant is moist inside or if outside temperature is very cold, you might have to use one of two alternatives—either impermeable insulation or vapor barriers with vented insulation. Cellular glass insulation is impermeable and may be used in such places. If you want a vapor barrier for any reason, vent the insulation to the cold side at many points. This will provide for drying out and prevent pressure build-up under the surface with consequent blister formations.

Roof adhesives—A non-running, non-flammable adhesive (M-8 pitch emulsion) was developed for Du Pont by Asphalt & Adhesive Division, The Borden Company, Middlesex, N.J. It answers the problem of overheated bitumens running through a roof and feeding an interior fire. It's used for adhering the insulation to the deck, or at the first course of the roofing if insulation is not used. It will not run at any temperature after it has once set up. Although the material costs about 2½ times as much as hot asphalt, it's still cheaper than calking a precast concrete roof tile or other prefabricated roof to prevent leakage and dripping of bitumens. Savings run 5 to 10¢ a square foot.

We are still a long way from having the perfect roof. One of the most urgent problems is to find an impermeable insulating deck for use over humid interiors and in northern climates, as a companion for the commercially available permeable cemented wood-fiber decks used over dry interiors or in southern latitudes. The objective again is elimination of vapor barriers.

Drainage—For several years Du Pont has used a method of calculating and installing roof drainage that was developed by the Ballinger Company. We call it "delayed drainage." Before this, we designed roofs so they would drain off all rainfall as soon as it fell. Now we permit the rain to build up to a depth of an inch or so and take it off at a reduced rate. Purpose is to trim the cost of interior drains and downcomers; also that of sewer capacity. For a 250,000-sq.-ft. three-story office building the savings ran about $23,000. Usually one drain is provided for each 30,000 square feet. But we never install fewer than two drains, so that one will draw off if the other gets stopped up.

Roof traffic—Flat roofs with bituminous covering won't take the gaff of roof traffic by maintenance men servicing roof-top equipment. Our asphalt consultant developed a traffic-wearing surface using sand aggregate and asphalt emulsion. This can be troweled onto the top surface of the bituminous roofing for an in-place cost of about 65¢ per square foot.

"Hypalon" synthetic rubbers and neoprene in liquid form, applied with an ingenious roller system, is the latest thing in **roof coatings.** Four coats of different colors reveal skips.

Expensive, yes, but well worth the cost if you plan pedestrian traffic on the roof. You can vary the thickness to provide slope for draining pocketed areas. If traffic is very heavy, we lay a type of asphalt and aggregate paving block made by Hastings Pavement Company, Inc. (Flushing, N.Y.). In place, this costs about $1.50 per square foot.

Synthetic rubbers—The Warden roof study also pointed to the need for improved roofing materials. A search has turned up several possibilities.

During the last three years, Du Pont has built 12 roofs using liquid neoprene and Hypalon synthetic rubbers. We haven't developed the techniques fully. But our 25 years' experience with neoprene, combined with what we know about Hypalon, suggests that properly applied layers of the two quick-drying liquids on poured insulating concrete deck should outlast high-grade bituminous roofing. Certainly it is competitive in price. These two materials are classed as non-flammable, with a flame spread rating below 25. In tests they have proved less flammable than bituminous roofs.

Our technique has been to put down two coats of neoprene over a primer on the concrete, then two coats of pigmented Hypalon synthetic rubber. Two coats each are necessary to cover the "holidays" (uncovered spots). Dry film thickness used so far is 20 mils. On one test installation it withstood foot traffic equivalent to 1000 people a week for 30 weeks. The only evil effects came from women's spike heels on soft vegetable and glass-fiber insulation. Similar roofs also have been laid successfully on plywood and vegetable fiberboard.

One big advantage in this liquid coating system: We can easily locate and repair a break in the surface. All we need is to mop one or two coats of Hypalon over the break. Another advantage is that such a roof can be maintained indefinitely. Unlike conventional roofs that must be torn off and rebuilt periodically, roofing of neoprene and Hypalon requires only recoating. Flashings for revisions, additions, and openings are handled easily by using wide tape to act as a bridge between new and old work, and as base support for the liquid elastomers. Right now we are using an adhesive-backed cotton tape, but we are searching for better materials.

Roofing film—Another material, Teslar polyvinyl fluoride film, shows promise as roofing material. It has had long-term tests in Florida that show life expectancy better than that of bituminous roofing materials. We have laid three roofs using an 8-mil white-pigmented film cemented to insulation. This film is handled much like roll roofing. It is smooth, can be washed down readily, and doesn't collect contamination. It also serves as flashing. It resists chemicals, ozone, and ultraviolet light. Just now it's available in limited quantities for experiment. We believe it can be laid for a price that is competitive with bituminous roofing.

Roofing failures—In our survey we found poor flashing caused almost as much trouble as blistering. To minimize it we are now doing three things:

1. Reduce flashing length and number of roof openings in such ways as combining openings or supports for pipe or equipment.
2. Plan and detail each flashing situation, leaving nothing to improvisation by roofers. Roofing manufacturers specify for standard situations only—and not precisely enough for most of these.
3. Buy only the best flashing materials. There's no money saved on cheaper ones.

New flashings—The ideal flashing has not yet appeared. But there are two outstanding new materials. One is Dow Chemical's vinylidene chloride, trademarked Saraloy. This is a thermoplastic that can be worked easily and sealed on the job. Samples show little loss of properties after nine years' exposure. The second material is a new preformed vent flashing made with neoprene. To install it you merely slip it over the vent. Both flashings are compatible with hot roofing bitumens.

FLOORS

Serious floor problems arise from heavy traffic, erosion by chemicals, or physical failure from some other cause.

Cracks on grade—Concrete floors on grade should be laid only over well compacted soil. Hand tamping is seldom adequate. If the soil is loose or composed of substantial amounts of vegetable matter, or if the grade has been raised by fill, replacement, and compaction in layers, you may have to use test control to insure adequate subgrade.

If the soil is not granular, or if the water table is near the surface, or if resilient flooring is to be laid on top, a polyethylene vapor barrier is low-cost insurance against later troubles. A recent English

development may help reduce cracks in concrete floors on grade. Two thin sheets of specially compounded polyethylene are laid between subgrade and floor. The resulting low coefficient of friction (claimed 0.25) reduces the restraint that subgrades normally place on slabs while shrinking during curing or cooling.

If we don't use this film, we break the slabs up into areas not more than 30 feet in either direction by means of contraction- or shrinkage-control joints. Sure, there is some evidence of occasional success with unreinforced slabs. But we believe that reinforcing is an economical insurance premium to pay for crack-free floors.

Floor dust—Concrete floors can create a dust problem, especially if finishers use neat cement to absorb water forced to the surface by troweling. Anti-dusting agents and heavier hardeners are available commercially and are quite satisfactory up to the limit of their capacity. We often finish floors with a method of rolling and removal of excess water. This provides a durable, hard, high-grade finish. But there is nothing the designer can do to insure the integrity of even the best-laid floors that cannot be undone by the unwise use of metal tires on carts or trucks—especially if truck maintenance is neglected so that wheels drag or wobble. Pneumatic tires are your best insurance for a good floor. Solid elastomeric tires run a close second.

New floor finishes—Some of them look promising. Tests indicate that a paint made of Hypalon synthetic rubber is the best concrete floor finish we have found. Light-colored samples on exterior sidewalks have shown little wear after nearly two years' service under a traffic of 100,000 people.

For wood flooring, several new urethane-base varnishes have exhibited abrasion resistance much higher than any other varnish known in the past.

Polyethylene film of six-mil thickness is fast becoming standard practice as a **moisture vapor barrier** under industrial concrete floors, especially where soil drainage is a problem.

WALLS

Over the years Du Pont has examined metal and other lightweight sandwich curtain walls and watched them improve in quality, performance, and cost. They have some big advantages over masonry walls, and undoubtedly are the wall form that will grow fastest in the next decade.

Masonry walls—Concrete block that is waterproofed, adequately reinforced, and provided with contraction joints is a highly satisfactory material. Where we want a different appearance, we use jumbo brick. To match older construction, we use standard-size brick.

Metal curtain walls—An exhaustive market survey was made recently by a large company, which has since gone into the metal curtain-wall field. The survey shows that aluminum will probably be the most widely used exterior material for curtain walls on multi-story buildings.

The most widely used coating on aluminum curtain walls will be porcelain, because of its decorative and physical qualities. This coating is completely weatherable, durable, and attractive for interior and exterior use. It is available in all colors and in all finishes from dull to high gloss. Porcelain on aluminum acoustic ceiling panels also provides an easily cleaned surface.

Mylar polyester film makes a durable coating for interiors of curtain walls and for acoustic ceiling panels. It can be laminated to almost any substrate. Its cleanability is unsurpassed. It can be backprinted, metalized, and (if desired) laminated to vinyl before laminating to metal or other substrates. You can get printed, metalized, vinyl-backed film with contact adhesive already applied.

Sandwich panels—Exterior sandwich curtain walls are usually designed individually. There are a few near-standard wall panels on the market, but we believe the ideal sandwich curtain wall has yet to be designed. Most designs today are too complicated to avoid leakage and other troubles. We have found that the best way to insure tightness is to use an elastomeric compression-seal gasket. Because of its proven 25-year weatherability and its simplicity of application, neoprene is a logical choice. Its in-place cost is competitive with that of polysulfide sealing compounds and in the long run is lower than that of vinyl sealing strips, whose life is relatively short. If color is needed, neoprene can be replaced with colored Hypalon synthetic rubber or, more economically, coated with it.

Insulation for sandwich curtain walls is now mostly glass fiber, but glass foam is also used because it's impermeable. Foamed styrene is being used in some residential and commercial panels. Foamed-in-place urethane has captured the imagination but not the market. Its engineering, quality control, and construction problems are formidable. A few firms are turning out satisfactory and economical panels, but

Neoprene prefabricated gaskets that are just snapped into place are among the latest and best **sealers** to insure tightness of window glazing and exterior sandwich curtain walls.

much more remains to be done before the new foam can realize its full potential. Its insulation value can be very high. It can be compounded to cover a wide range of density, resilience, strength, texture, moisture absorption ratios. It has twice the working temperature of foamed styrene and can be made fire-resistant. Also, it adheres well to most materials.

DOORS

Wood doors are usually frail. They suffer from poor dimensional stability, breakage, and general debility. Steel doors now available probably give the best service in hard usage. But keeping them painted and corrosion-free is sometimes a problem.

Metal-door coatings—Du Pont is experimenting with pigmented Teslar polyvinyl-fluoride film laminated to the steel as a protective and decorative coating. Work has not progressed far enough to prove this is an answer, but it looks good so far. We are also using abrasion-resistant coatings of urethane and Hypalon synthetic rubber. For good appearance, porcelain on aluminum is a highly resistant finish.

Door hardware—Improvements are coming, chiefly in the form of durable and economical plastic parts. To exploit the advantages of these newest plastics, hardware makers are drastically redesigning the whole assembly—simplifying and improving it.

Today's new plastic materials, used with technical sophistication and sound design, are justifying confidence. One of these is Zytel nylon resin. Whereas cast brass parts may require machining, nylon can usually be molded to close tolerances. This makes it economically attractive. Also, it's practically self-lubricating.

Delrin acetal resin is a brand-new plastic material for hardware and plumbing. It is stronger, harder, and stiffer than nylon. At least two hardware manufacturers are offering doorknobs made of the new plastic. It is integrally colored, stainless, and electrically non-conductive.

WINDOWS

Most window problems remain to be fully solved. Metal sash still corrodes, wood sash still rots, and glass still breaks.

Today the most durable sash material seems to be porcelainized aluminum. Certainly, metal frames have a good deal to offer over wood for some exposures. But protective coatings will have to be a great deal better than they are now.

Not only do we need adequate protective coatings. We also need insulation of both sash and glazing to prevent condensation, which causes rust and rot. Another thing needed, but still 'way off in the blue-sky area, is an optically clear material with low thermal conductivity. Double-paned panels don't fill the bill completely.

Incidentally, windows are expensive compared to factory walls. They cost up to five times as much as the wall area they replace, or about 2% of the first cost of a building. A recent Building Research Institute conference revealed that heat losses through windows require capital investment for air conditioning equipment of $10 to $15 per square foot of window area and from $1 to $1.50 per square foot for annual heating and cooling cost, depending upon location. Window cleaning is estimated to cost 25¢ per square foot annually. And window maintenance over and above cleaning may approach 11% of the maintenance costs of a building. These facts make windows a fat target for cost reduction.

Construction progress—Advances have been made in unusual aspects of window construction. Lucite acrylic resin is one of the most weather-resistant plastics known. If there ever is a plastic house, this is probably what it will be made of. Soon both flat and corrugated sheets of Lucite acrylic syrup, reinforced with glass fiber, will be marketed. You'll be able to use Lucite in much the same way as the old polyester sheets, similarly reinforced. The weatherability of reinforced Lucite far exceeds that of polyester, at a price roughly comparable. These colored, translucent sheets can be used as windows or as replacements for corrugated sheets in metal buildings.

Glare reduction—Up to now, integrally tinted glare-reducing glass has been expensive. But today you can get an organic coating called Sun-X for application to finished window glass. It is not a permanent process, but it does last several years. And it costs only a fraction as much as the premium you'd pay for integral tinting.

Seals for glazing—Seals for metal sash may be either mastic compounds or solid glazing strips. Because of first-cost economy, plasticized vinyl glazing strips are often used. But these don't stay tight and eventually prove troublesome. From the long-term point of view, long-lasting neoprene glazing gaskets are more economical. Because neoprene is a true elastomer with very low compression set, it fights back against the pressure that is needed for a watertight seal between glass and window sash. And, in contrast to glazing compounds, it eliminates the costly process of clean-up.

A Rough—but Ready—
PLAN TO CUT INDIRECT COSTS

Budgetary control failed to hold a lid on indirect labor costs in this plant. But the lid's on tight now. Here's the plan that made the difference.

Measurement of indirect work has helped The Maytag Company (Newton, Iowa) cut some indirect labor costs by as much as 50%, according to Industrial Engineering Manager J. F. Biggane. Thus far, the company has measured only about one-fourth of the indirect work in production departments. But the program goals are: coverage of 80% of all indirect labor; 25% improvement in utilization of indirect labor.

Management Daywork Analysis (MDA) is the key. It's an approximate measure of non-repetitive indirect work that isn't ready for the type of measurement required for incentive pay. Its aim is to help management improve methods, plan personnel requirements, assign work, and control costs better. It provides opportunities to combine, rearrange, and simplify indirect jobs.

Maytag considers labor indirect if it doesn't change the size, shape, or appearance of its products. Company management used to think it had pretty good control of indirect labor costs through budgetary control. Then a survey of indirect labor showed that the number of people doing indirect work had climbed to over 60% of the direct labor force. The survey showed the need to find a method—short of incentives—to supplement budgetary control.

SEVEN STEPS TO MDA

Use of MDA is best described in these steps:

1. Analyze the work performed in each cost account in each plant cost center to improve methods, recommend use of more effective equipment, etc.

2. Measure the required work in each account, establish time values. Measurement techniques depend upon the type of work involved. Some data are as accurate as any used to establish incentive standards. Others are not as refined. Even so, the measured time is all right for the purpose. Emphasis is on inexpensive measurement. Standard data, developed for incentive work, fit some work of these indirect jobs. Sometimes estimates are used for minor work elements.

3. Prepare a written MDA for each daywork job. It includes description of the work and the daywork time, plus identifying data relating to the current shop layout, production level, etc.

4. Review the MDA with the department supervisors to assure the most efficient methods and inclusion of all the required work. Production supervision approves the written MDA.

5. Instruct supervisors on how to use MDA to plan personnel requirements, determine work assignments, control indirect labor costs.

6. Inform management of results through a weekly report of MDA. Report shows measured daywork hours, paid hours, and percentage of manpower utilization.

7. Review and revise (where necessary) the work description and measured daywork hours. Review is called for when product design changes, layout revisions, new equipment, production schedule changes, and other changes affect the work done by indirect labor.

ONE ESSENTIAL IN MDA

Participation of line management is one very important detail in MDA. Superintendents and foremen help develop the details of indirect work required. They review and approve measured daywork time. And they assume responsibility for the utilization of indirect manpower and all improvements of methods, performance, and costs. They try to get more indirect work done within the measured time.

Weekly reports show the standings in all cost centers. High and low performances are looked into by line managers. But line supervisors do not use measured daywork time in discussions with operators concerning their job duties. MDA gives supervisors information they use to help manage better.

FOUR EXAMPLES OF MDA

Maytag does have some wage incentives on indirect labor, including stock handling, process tending, housekeeping, and product rework. They're jobs that are somewhat standardized, measurable, and can be related to production. But, like other plants, there is a lot of indirect work that is not yet ready for incentive applications. This is the area on which MDA applications are concentrated. On the facing page are four examples of Maytag's use of MDA.

EXAMPLE 1

Loader-unloader of wash line conveyor *hangs parts on conveyor hanger or places them in baskets. He also removes washed parts, puts them in containers; moves loads of parts between storage and wash line; handles hangers and baskets; and tallies the number and types of parts washed.*

The workload on this job is not constant, and the job is not covered by incentives.

It isn't possible to reach 100% utilization until the method or schedule of loading and unloading is improved, or until higher production levels provide more manual work time.

EXAMPLE 2

Clean-up labor in machine shop *has quite a list of duties, including these: remove chips from machines, pump oil and "soup" from machines, pump "soup" from hardware bins, clean sludge from grinder, clean pump unit, move waste dumpster, change light tubes, set up barrels of oil and cleaner, and a few more similiar jobs. MDA specifies the normal frequency for nearly all work elements. The work may be done by several people (including diverted direct labor) on a part-time basis or by full-time men.*

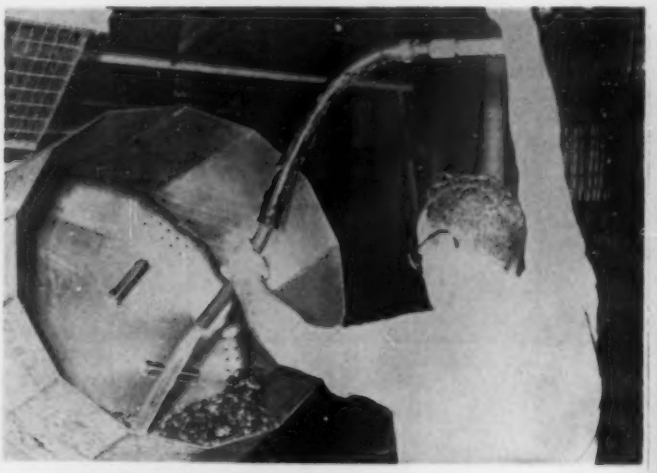
Over a short period of time the hours paid for indirect work in this shop were reduced 15%.

EXAMPLE 3

Truck operators *(of electric and propane-powered fork-lift trucks) were first measured in MDA program.*

To measure the workload for normal production, foremen supplied data on number of moves, type of truck, nature of load, route, and distance. Measured time for each kind of move was developed from truck manufacturers' data and time studies. Measured times are applied to work done at normal production volume. Adjustments are made for changes in production level.

Over-all, the efficiency of truck operators was improved 23%. In some areas the improvement was 50%. Average performance of trucking has gone up to 93%.



EXAMPLE 4

Barrel finishing and storage attendant *now does a combination of three kinds of work. The attendant loads and unloads the barrel, tends an in-process storage area during the barrel-finishing cycle. Also, he cleans the barrel, storage, and small-press areas.*

The MDA approach developed and worked out a combination of work requirements and measured time for the three categories of work.

These are only four samples of the many jobs to which Maytag has applied MDA. The company's management is convinced that this is a very useful cost control tool for indirect labor.

WHERE ARE THE WONDERFUL TRANSISTORS?

an editorial commentary

BY G. C. QUINN
ELECTRICAL EDITOR, FACTORY

Before coming to FACTORY, Jerry Quinn spent 18 years in the electrical, production test, and technical editing departments at Allis-Chalmers. A graduate EE, he supervised wartime test operations on special equipment for the Manhattan (A-bomb) project.

"We used to have continual tube troubles. Now we're using transistor controls and practically never have maintenance problems."

"We've been after our control supplier to change over to semiconductors instead of tubes, but all we get is the runaround."

"About 80% of all our instrument maintenance involves tubes."

"Where are the wonderful transistors?"

Setting for these contrasting remarks? The 1960 Plant Maintenance and Engineering Conference. Participants? The men responsible for control maintenance. Daily they read glowing reports of high power, infinite-life semiconductors, relay-free control panels, solid-state thyratrons. They hear about the coming era of "molectronics"—when entire control circuits will fit inside a pea. Yet right now they can't buy a 50-watt ultrasonic cleaner that's not loaded with tubes!

Part of their frustration stems from the industry build-up on transistors. True, there seems no limit to what semiconductors may do. But claims that some day we'll have such wonders as transistorized, shoebox-size induction heaters don't cut today's maintenance bill.

Why do so many new industrial electronic devices still use tubes instead of semiconductors like transistors or controlled rectifiers? (We're not talking here about straight industrial rectifiers—germanium and silicon semiconductors are now predominant in this area.) Semiconductors do have these advantages: virtually no maintenance, small size, high efficiency, ultimate low cost, no warm-up time, extremely long life. *But they also have serious operating limitations that would-be users sometimes forget:* very little reserve capacity, fixed operating temperature limits, greater sensitivity to electrical surges and radiation (from heat to x-rays), and an uncomfortably wide performance variation between units.

Are these limitations the real reasons you can't get maintenance-free controls? Talk to plant engineers, control designers, tube manufacturers, transistor engineers. They'll each give different answers. Let's get specific. Take four typical pieces of electronic equipment—photocell controls, variable-voltage motor speed controls, resistance welder controls, and induction heaters.

Photocell controls are naturals for transistors. Lately most photocell control makers *have* switched to semiconductors except for special types (e.g., where output must be high).

Tubeless variable speed drives for tools and production machinery could change the maintenance picture in many areas. There's plenty of talk about change here—and *some* action. Control manufacturers say, "New controlled rectifiers are the logical substitutes for thyratrons, but extra engineering, protective devices, and the components required boost costs well above tube-using units. We don't think customers will trade promised cuts in maintenance for bigger initial cost. So designers have limited transistors to the 'logic' and amplifier portions of motor controls." Result: Tubes will go on handling the power end unless a breakthrough in technology or customer pressure forces a change.

Resistance welding control is even more closely tied to tubes. Energy surges are too great for semiconductors to handle in all but the small units. If you want static controls you'll have to first push for them in welder timing and hydraulic circuits.

The tubeless induction or dielectric heater is still further away. Despite the pushing the military is doing for high-frequency, kilowatt-power transistors, change here is not in the cards yet.

Summing up: In some areas virtually maintenance-free controls exist right now. But, for some electronic equipment there's no change in sight. In remaining areas, *you could get better controls tomorrow—if you're willing to squawk loud and pay just a little more.*

A

FACTORY

ENGINEERING AND TECHNOLOGY REPORT

PRODUCTION COUNTING

NO. 4

COUNTING

Editorial research directed by Mervin F. Roberts, Associate Editor, FACTORY

SIX GOOD REASONS FOR COUNTING PRODUCTION

1. To tell a machine operator when to stop a production run.
2. To give a customer the amount ordered—no shortage, no baker's dozen.
3. To solve a pilferage problem.
4. To pay for piecework.
5. To set up a maintenance schedule, based on number of items made.
6. To provide a productivity yardstick. To estimate costs, to compare techniques.

How do manufacturers count? The field is wide open. There are plenty of devices. Simple and sophisticated. Cheap and expensive. Slow and fast. Reasonably accurate and exact. Insensitive and sensitive.

The round-up of production counting devices in these pages is the result of visits to factories, talks with manufacturers of counters, and even a blue-sky interview or two. It is a broad review of the classes of devices in the market. Some are packages that solve a problem when they are simply plugged into an electrical outlet or screwed into a bracket beside a conveyor belt. Other packages may be assembled from standard components. Some problems require a "custom" job. Fortunately, these are rare.

In fact, nearly every factory-production counting job can be solved today with off-the-shelf equipment—and often solved for less than $500. Below is a quick run-down of counting methods and of ways in which a variety of manufacturers count a variety of their products. It tells what counters cost. How good the count is. How to protect the integrity of a count.

THREE STEPS IN COUNTING

Counting experts start by breaking the problem down into the counting lingo. It's a three-step process:

1. **SENSING**—*perceiving the units to be counted.*
2. **LOGIC**—*adding, subtracting, combining, stopping the machines, or whatever.*
3. **READOUT**—*reporting results, either continuously or periodically.*

So there it is. For $5 or $5000 these three processes are more or less what is in the counting package.

1. SENSING

The devices used in industrial counts are much like human senses. They touch. They see. They weigh. They can even hear. They receive an impulse. From this impulse they count.

Industry relies mostly on four basic impulse techniques to trigger counting jobs:

• **Touch, or contact.** This is good for counting electrically conductive products. The thing to be counted closes a circuit as it passes between contactors. A relay pulls in and a ratchet advances the count one digit. Devices of this kind cost about $15.

• **Displacement.** The item passes a counter whose arm is displaced or rotated by the moving item. This is the action of most ordinary counting applications. A heavy item rolls or slides over a sensing lever and deflects it downward. Or in any other direction, same principle. Simple mechanical counters can be bought for $5 and up.

• **Photo-sensing.** This is the electric eye. It's a workhorse today. It was misapplied and often poorly linked to the counting package in past years. But now the bugs are out of it, and the enormous value of this sensing technique is an established fact. Advantages keep increasing as better light sources, optical systems, and photo-sensitive materials become available in price ranges that plants can afford.

Today, solid-state photo-conducting material (cadmium sulfide, for instance) is doing more of the jobs that the older types of gas-filled or vacuum photo tubes used to do. Solid-state photo-conductors are good for counts in the 1000-per-minute range. But as counting speeds get higher, the problem of time-lag inertia within the cell occasionally comes up. Even so, the solid-state conductor has at least one big advantage: It passes more current per lumen of light than a photo tube. This means that sometimes an amplifier tube can be omitted from the circuitry.

Gas-filled photo tubes are faster in response and less sensitive to temperature change, but pass less current per lumen.

Vacuum photo tubes pass still less current but have longer stable life over a wider range of voltage and temperature. If a photo-conductor is "pushed"—that is, if it is asked to pass more current than it is ideally designed to pass—its life (and reliability during life) will be impaired. Amplification of photo-eye signals by conventional industrial vacuum tube amplifiers is then the answer, and should be specified whenever the job

to be done requires more current than the sensor will conduct. (This is really a problem for the counter manufacturer. It is mentioned here to explain the wide range in price of what are sometimes described as "competitive" units. Some "push" the sensor. Others operate with less current through the sensor and more amplification.)

• **Proximity sensing.** These devices rely on capacitive and inductive properties of materials. All materials, not just electrical conductors. This marvelous application of electronics is so sensitive and reliable that some manufacturers use it to check the count of pills in a filled, capped bottle. Each counting problem must be individually engineered for proximity counting. Proximity sensing is sophisticated, high-speed, reliable, excellent for handling long runs.

When it comes to making a choice of sensors, the criteria are not easy to set up in hard-and-fast rules. Usually the successful application is the simple one.

The rotary counter is simple, especially for linear measure. If there is a linear movement of a wire or a tape, or a rotary motion of less than 900 rpm., or a rotary motion that can be geared down to that speed or slower, there is a good case for linear counts with a direct drive from the product—or from the machine that drives or pulls the product. Applications of this principle are illustrated later in this article.

For intermittent items, like cartons or clay tiles on a belt, the ratchet-operated mechanical counter senses through a lever that is deflected by each item. The lever springs back between items. From 600 to 900 counts per minute is the top ideal speed. Some rotary and ratchet counters are rated for intermittent service at 3000 counts per minute. But if the air is not clean, the temperature not steady, or the counter not vibration-free and perfectly aligned, a long, fast count will wreck the instrument.

To make the counter last longer, some people recommend remote location of the readout. This way, the sensor actuates an electrical switch, and the electrical impulse through the switch closes a relay on the remote readout, thus advancing the number one unit.

When the manufacturing process requires the product to be counted in a wet, dusty, or corrosive atmosphere, the purchaser has a choice between a hermetically sealed readout at the sensor, and a sealed sensor with the electro-mechanical readout in a remote location. The choice depends on economics. Today's trend is to read remotely, unless the readout is required at the operation.

Weight sensing is used in industries where small articles—screws and nuts, for example—are sold by the 100, or gross, minus zero, plus one unit. Highly sensitive weight-counting is dependent on small batches—so small that the total batch variation of unit weights, plus the weighing error, is still less than half the weight of one unit in the batch. This assures a perfect count. Later in this report there is more about small-batch-weighing.

2. LOGIC (AND AMPLIFICATION)

For counting small items moving rapidly, an electric-eye photocell is often used. The light playing on the cell is interrupted every time a unit goes by, but the energy signal at the photocell is sometimes so small it cannot actuate the ratchet of the counter. So this signal must be amplified.

The amplifier is like a radio amplifier. It strengthens the signal—strengthens it enough so it can do useful work. The amplification of weak signals is usually in the "black box," along with any logic that the system calls for. The logic may be simple addition. Or it may be totals of several counters and a grand total of them all. After the totals there may be a shrinkage (due to rejects) that calls for a subtraction from the total. Logic also can be devised to slow down a machine when production reaches 95% of a predetermined number, and to turn it off at 100%.

Most "black boxes" in the market today also provide readout as well as amplification and logic. This is probably because people like to see the number pile up. The predetermining feature (sometimes called programing) is often the only feature they really need, but the visual readout is reassuring.

Some predetermining devices, fully mechanical, cost as little as $30. Electric units start at about $250. Electronic units are faster, and today the market offers a score of them in the price region of $400. These units can be set up to start and stop the counter, start and stop the machine in cycles, mark every 25th item, or whatever. All this is part of the black box called logic.

Today, counters are available that simply accumulate units (digits, that is) by the decimal system. Some add up digits in a binary fashion (doubling, that is). The count accumulates on a readout that shows a signal for 1, 2, 4, 8, 16, 32, and so on. A count of 3 shows as 1 plus 2. A count of 18 shows as 16 plus 2.

Most modern counters accumulate digits by the decimal system. Some also handle dozens, adding digits to 12 and then advancing the dozen count by 1. A second dozen counter will provide a record by the gross.

One manufacturer offers a predetermining counter with a plug-in feature that permits a user to exchange 10- and 12-count stages. This is especially desirable for industries that deal in dozens and grosses. Bakers, if they insist, can even obtain logic boxes for bakers' dozens.

Turn the page

COUNTING
COUNTING
COUNTING

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The rotary counter is simple, especially for linear measure. If there is a linear movement of a wire or a tape, or a rotary motion of less than 900 rpm., or a rotary motion that can be geared down to that speed or slower, there is a good case for linear counts with a direct drive from the product—or from the machine that drives or pulls the product. Applications of this principle are illustrated later in this article.

For intermittent items, like cartons or clay tiles on a belt, the ratchet-operated mechanical counter senses through a lever that is deflected by each item. The lever springs back between items. From 600 to 900 counts per minute is the top ideal speed. Some rotary and ratchet counters are rated for intermittent service at 3000 counts per minute. But if the air is not clean, the temperature not steady, or the counter not vibration-free and perfectly aligned, a long, fast count will wreck the instrument.

To make the counter last longer, some people recommend remote location of the readout. This way, the sensor actuates an electrical switch, and the electrical impulse through the switch closes a relay on the remote readout, thus advancing the number one unit.

When the manufacturing process requires the product to be counted in a wet, dusty, or corrosive atmosphere, the purchaser has a choice between a hermetically sealed readout at the sensor, and a sealed sensor with the electro-mechanical readout in a remote location. The choice depends on economics. Today's trend is to read remotely, unless the readout is required at the operation.

Weight sensing is used in industries where small articles—screws and nuts, for example—are sold by the 100, or gross, minus zero, plus one unit. Highly sensitive weight-counting is dependent on small batches—so small that the total batch variation of unit weights, plus the weighing error, is still less than half the weight of one unit in the batch. This assures a perfect count. Later in this report there is more about small-batch-weighing.

2. LOGIC (AND AMPLIFICATION)

For counting small items moving rapidly, an electric-eye photocell is often used. The light playing on the cell is interrupted every time a unit goes by, but the energy signal at the photocell is sometimes so small it cannot actuate the ratchet of the counter. So this signal must be amplified.

The amplifier is like a radio amplifier. It strengthens the signal—strengthens it enough so it can do useful work. The amplification of weak signals is usually in the "black box," along with any logic that the system calls for. The logic may be simple addition. Or it may be totals of several counters and a grand total of them all. After the totals there may be a shrinkage (due to rejects) that calls for a subtraction from the total. Logic also can be devised to slow down a machine when production reaches 95% of a predetermined number, and to turn it off at 100%.

Most "black boxes" in the market today also provide readout as well as amplification and logic. This is probably because people like to see the number pile up. The predetermining feature (sometimes called programing) is often the only feature they really need, but the visual readout is reassuring.

Some predetermining devices, fully mechanical, cost as little as $30. Electric units start at about $250. Electronic units are faster, and today the market offers a score of them in the price region of $400. These units can be set up to start and stop the counter, start and stop the machine in cycles, mark every 25th item, or whatever. All this is part of the black box called logic.

Today, counters are available that simply accumulate units (digits, that is) by the decimal system. Some add up digits in a binary fashion (doubling, that is). The count accumulates on a readout that shows a signal for 1, 2, 4, 8, 16, 32, and so on. A count of 3 shows as 1 plus 2. A count of 18 shows as 16 plus 2.

Most modern counters accumulate digits by the decimal system. Some also handle dozens, adding digits to 12 and then advancing the dozen count by 1. A second dozen counter will provide a record by the gross.

One manufacturer offers a predetermining counter with a plug-in feature that permits a user to exchange 10- and 12-count stages. This is especially desirable for industries that deal in dozens and grosses. Bakers, if they insist, can even obtain logic boxes for bakers' dozens.

Turn the page

3. READOUT

Today's market offers management all sorts of visual signals for reading a count. Simple ratchet or rotary counters kick a wheel of numbers. This is the typical odometer on an automobile. Hand-operated tally machines in the lumber and clothing industries do the same. And so do fuel-dispensing meters at refineries and service stations.

If electricity is involved in the counting system it is a simple matter to have lights indicate the number. Glow tubes will display a "pip" of light in any one of 10 or 12 positions. Each advance of the pip position is a count of one more unit. Other glow tubes actually spell out the number in Arabic character—or any other language, for that matter. Luminous visual-count units displaying five digits this way are sold for less than $500.

Management often wants to read the count remotely from the sensor. That means the signal must be transferred from the sensor to an amplifier or an electrical circuit for the remote reading. Sometimes the sensed signal is strong enough to throw a sensitive switch. The switch, in series with a relay on the counter, will advance the count, one unit for each click of the switch. The switch in this case is an electric contactor, which changes a mechanical signal into an electrical signal. So it (and all other devices that transfer signals from one energy system to another) is called a transducer. The photo-sensitive device and the solenoid are also transducers. A counter that advances mechanically when a relay coil is energized is called an impulse counter—or more popularly, a magnetic counter.

Remote readout is often desired to protect sometimes sensitive or delicate and often expensive mechanisms from factory atmosphere. Vibration, dust, corrosive fumes—these are the enemies of electro-mechanical devices. So even when tampering with the count is no problem, it is often good practice to locate the readout remotely and thus improve the reliability and longevity of the counter. In the case of one installation described elsewhere in this report, the readout is for the convenience of the workers on the floor. So it must be as near the machine as possible. To keep such devices clean they are often mounted in sealed outer cabinets with windows at the readout points. Many of the newer predetermining counters are available in virtually airtight cabinets.

The permanent record of production against a time base is popular with industrial engineers and time-study people. They like it because they can make an analysis from an armchair. More important, they need not hover over a worker to count a rate.

Best practice in heavy industry puts logic and readout in areas remote from the production machine. Some of the reasons have been described already. One added reason is that logic and readout are often sensitive to voltage fluctuations. And since remote control usually puts these voltage-sensitive devices onto independent power sources, the reliability of the count improves.

These Experts Lead the Counting Field

"The counter links production to control. It's a stage in automation." *Allan L. Burton, Veeder-Root, Inc., Hartford, Conn.*

"Cost of high-speed electronic predetermining counters is now competitive." *J. R. Schoenbaum, Standard Instrument Corporation, New York.*

"Photoelectric counting is simple and cheap. Buy the component packages and do it yourself." *A. Edelman, Photobell Company, New York.*

"The surface for industrial application of counters has been hardly scratched." *N. A. Moerman, Electronic Counters Inc., Syossett, N.Y.*

HOW YOU CAN CONTROL TAMPERING

Factory production counts are sometimes cursed with tampering and the resulting problem of count inaccuracy. Jokesters or disinterested meddlers are forever gumming up the works. Sometimes the meddler has a motive. He might want to stop the count to pilfer items, and go undetected because the counter will still agree with the inventory. He might want to increase the count if his incentive pay depends on product count. He might want simply to discredit the industrial engineer or time study. Regardless of what the meddler is up to, it is up to management to protect the integrity of the count.

What can management do? Here are some suggestions:

● *Use multiple counters.* Place them several feet apart on the same line. If possible, they should be located in separate work stations—better still, in separate work areas. If one counter disagrees with several others it should be checked for accuracy before any suspicions are cast at employees. The employees should be told why there is a count. Sometimes employees sabotage the count because they fear it. They fear the unknown.

● *Locate the sensor in a remote, inaccessible area.* If the product moves between floors it might be counted right under the ceiling of the lower area.

● *Place readout in a remote, inaccessible spot.* The superintendent's office, for instance. The readout can be printed against a time base. Then unusual production fluctuations will be permanently recorded, even to the shift and time they occur.

● *Use a predetermining programed recorder to signal any unusual activity.* Production count might be 30 cartons per minute. A black box (logic-programer) will signal a slow-down to 25 or speed-up to 35 (or whatever) per minute. Without any excitement, the device will show where and when the fluctuations occur. Another step is to record downtime of each machine feeding the production line. This can be on the same recorder that shows the product count. This will show which machines provided what number of products. This sort of signal and record is wonderful not only for time studies but also for charting maintenance versus downtime.

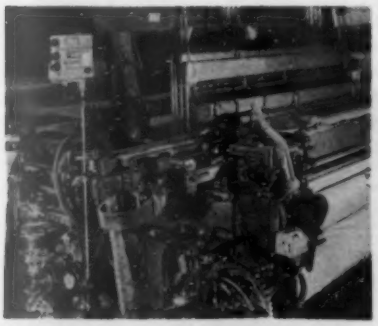
● *Place the sensor in a tunnel.* Then no one can inadvertently walk through the beam of light or brush up against the lever on the ratchet counter.

● *Make counters tamperproof.* Counter manufacturers offer a wide variety of key-locked resets and other tamperproof arrangements. Plant management must choose the package that best suits local conditions.

● *Allow workers to police the counter (and each other).* Some factories base wages on count. Production line has several workers who place their identical output on one conveyor belt. There is no problem with accuracy here. The workers police themselves and their counters. Counters are placed for easy reading. Product from first work station passes through all succeeding counters on the line. The second work station sends product through all but first counter, and so on. Individual production is calculated by subtraction. All the workers keep each other honest.

● *Combine several safeguards.* Locate the readout (preferably against a time basis) in the superintendent's office; locate the sensor in an inaccessible place. Some factories count to pay incentives, depending on just one counter to record all production. Here the temptation to cheat is strong. A high run might be faked by tampering with the counter, and the indicated shortage would be made up on successive days by holding the counter back until the deficit is paid back. Or the deficit is never paid back. And then, for a while, management thinks there is pilferage. The truth is, money is stolen in the form of unearned incentive pay. But no merchandise was ever actually removed from the plant. This sort of tampering plays havoc with time studies and preventive maintenance schedules.

EIGHT COUNTING EXAMPLES YOU CAN COPY

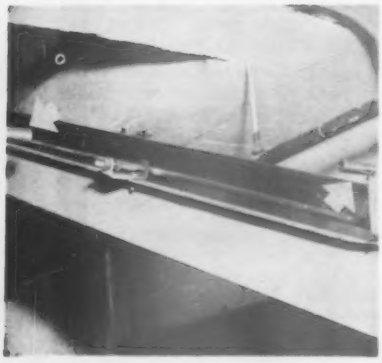


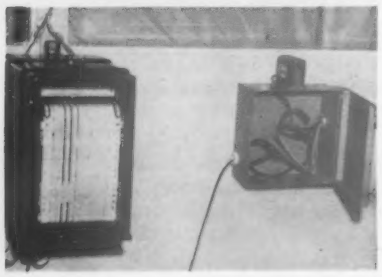
TEXTILE COUNTS FOR YARDAGE AND PAY

Here, linear measure is important for piecework, incentive, machine downtime, and predetermining. This loom has a predetermining counter near the roll (lower right). Function is to stop production when yardage on order is woven. Counter with the three readouts (upper left) is for production per shift. Totals can be picked up here, too. Three shift yardage counters list for about $40 complete. Predetermining counters start at about $30 list.

TABLETS ARE COUNTED, AND INSPECTED, TOO

Pills and tablets have similar, uniform shapes. They require both inspection and count. Chutes of dimensions that cause items to line up are inclined under a glass inspection plate. When all the chutes are full, an exact count is assured. The operator inspects visually and releases all the chutes simultaneously. Four chutes fill one pill bottle. This application is at Merck Sharp and Dohme, pharmaceutical manufacturers, Philadelphia. Granted, electric-eye machines have been designed to do this job faster. But when the product must get a final human inspection for appearance anyway, the inclined chute serves two purposes—inspection and counting. That is why it is still favored for this application.



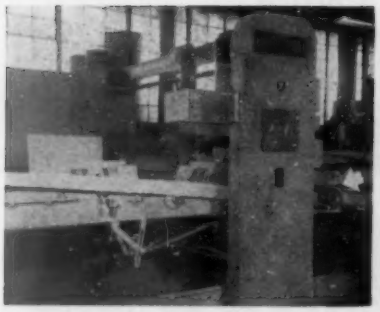


PACKAGE COUNT WITH REMOTE READOUT

Cartons at the sealing machines are too close together to be counted accurately. Nestlē's answer: Find a place where they are not close together, count them there. At the Nestlē plant in Fulton, N.Y., cartons spread apart as they slide down the chute from factory floor above to warehouse floor below. Near the ceiling—out of harm's way—is a photoelectric counter. The readout is in the superintendent's office on the factory floor. On his office wall is a permanent record, on paper, of the operating time of each carton sealing machine. On the same paper a pip is registered for each carton on the combined product conveyor line. These pips are not used for the count but simply to indicate to management the total flow of product in terms of the sealing machines in operation. The exact count comes off the small photo-relay operated magnetic counter on top of the 4x8x8-in. box alongside the graph. Nestlē industrial engineers chose an oversize box to permit future installation of additional counters. The photoelectric sensing package costs about $120. The magnetic counter readout costs about $15 more. The multi-position tape record is an added starter. Depending on the number of pens required, the price for devices in this class starts at $200 for a two-pen unit in which the pips represent batches of 10 units.

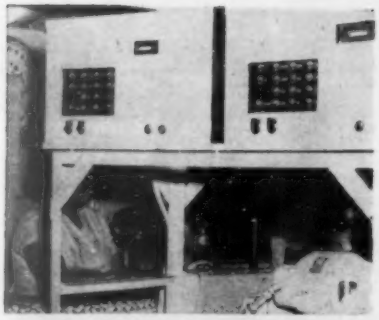
FAST BATCHES OF 100 PLUS OR MINUS ONE

High volume, low unit value. A 1% error in favor of the customer is cheaper than paying for a more precise counter. Count a sample of one, or a dozen, or a hundred, or a gross, and place the hand-counted sample on one balance pan. Then vibrate the hopper and let the product pile up on the other balance pan until the beam begins to level off. The balance beam swings across one photo-sensitive element and cuts a light ray. This sensing is amplified, and it signals the vibrator to operate at a lower tempo. Items continue to slide into the package, one at a time, until the second photo element is covered by the beam. This stops the vibrator completely. This packaging arrangement will increase output per worker by a factor of 4 or 5. The scale and photocell package cost $300. The complete package, including the two-speed vibrator, costs $1000. This installation is at the American Nut & Bolt Fastener plant, Pittsburgh.



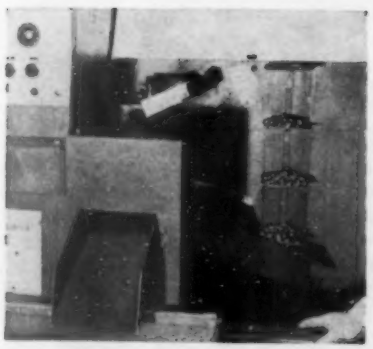
TWELVE BATCH COUNTS PER MINUTE

Folder-gluer machines, formerly operated at relatively slow speeds, used electro-mechanical devices to separate the finished cartons into batches of a given number. New, faster electronic batch counter operates as follows: A photoelectric sensing device (arrow) counts cartons as they pass through a light beam on the side of the machine. The count is fed into the black box. Black box opens a solenoid valve, and a tablespoon of water is sprayed on the last carton of the batch. The operator sees the damp spot and knows he has the exact count for the bundle. The system can operate at carton speeds up to 400 per minute.



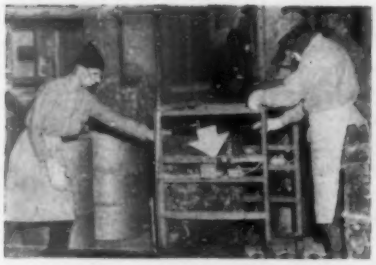
1,500,000 UNITS PER DAY—BATCHED

Bottle crowns are custom made. Overruns are costly and shortages are intolerable. Mundet Cork in its North Bergen (N.J.) plant has a bank of machines making bottle caps and a bank of predetermining counters that swing the chute—spewing crowns at 3200 per minute—from the filled carton to the empty one alongside. On the feed chute, a light beam passes through a hole to a photocell. The counting rate is about 53 interruptions of the beam of light per second. Magnetic counters—relays, that is—clicking at this rate are not reliable. So the count is electronic, and the relay works only at the end of each predetermined run—every 2½ minutes or so. It activates a solenoid that swings the chute. The readout can be either binary or digital. It really doesn't matter which. (Mundet has both.) The predetermining feature is the most important function of this control. Logic boxes are mounted over the workers' heads. Low enough to be easily reset. High enough to be out of the way of moving equipment. Oil, dirt, dust, or lint on this photo-sensor at Mundet might weaken the integrity of its count. If that happened, mechanical, magnetic pick-up, or capacitance sensing would be the answer. The black box doesn't have to know where the signal comes from.



FASTEST EXACT COUNT OF ODD-SHAPED BATCHES

Automatic parts counter handles expensive little items made in large quantities. It counts 2,000,000 per day by weighing batches so small that the weight variation of the product does not cause a count error. The product in the hopper (lower left) is elevated on the endless chain of trays. Full tray is dumped into cup, which spills onto the weight pan. Pan weighs for the count and releases product down the slide and into the box. Exact count of 5000 pieces, or 30 batches per minute, is easy for this device. Weighing element is a balance scale with electrical differential transformer as a sensor. The price of this machine is approximately $10,000.



DRUMS PASS THROUGH TUNNEL FOR ACCURACY

At the Oakite Company plant (Brooklyn, N.Y.), a tubeless photoelectric counter across the roller-conveyor registers drums of industrial chemicals. The problem here is to protect the integrity of the counter from inadvertent tripping of the sensor. There are no vacuum amplifier tubes in this device. And since the magnetic counter works off 120 volts a-c, it can be located anywhere in the plant. The "tunnel" costs may be $15. The entire photoelectric counting package costs another $100. Installation is simple.

PAY RATES FOR KEY INDIRECT JOBS—IN 9 CITIES

All figures are average straight-time earnings in manufacturing industries except figures with asterisk, which are for all industries. They include incentive pay, if any, but not overtime, weekend holiday, or night-shift premium.

Weekly earnings are average salaries for standard work week.

MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN

	BALTIMORE, SEPT. '59	BOSTON OCT. '59	BUFFALO OCT. '59	CANTON DEC. '59	CLEVELAND SEPT. '59	DALLAS OCT. '59	MIAMI DEC. '59	ST. LOUIS OCT. '59	SEATTLE AUG. '59
MAINTENANCE AND POWERPLANT JOBS Average straight-time hourly earnings									
Carpenters, maintenance	$2.70	$2.51	$2.79	$2.80	$2.87	$2.44	$2.40*	$2.86	$2.67
Electricians, maintenance	2.77	2.72	2.97	2.89	2.97	2.56	2.28	3.03	——
Engineers, stationary	2.52	2.73	2.71	2.68	2.98	2.33	2.35	3.02	2.74
Firemen, stationary boiler	2.25	2.23	2.42	2.50	2.51	——	——	2.64	2.39
Helpers, trades, maintenance	2.20	2.05	2.48	——	2.51	1.76	1.73	2.56	2.25
Machinists, maintenance	2.95	2.74	2.93	3.01	2.95	2.53	2.42	3.02	2.89
Mechanics, automotive, maintenance	2.36	2.50	2.72	2.61	2.83	2.10	2.03	2.82	2.71
Mechanics, maintenance	2.78	2.40	2.85	2.70	2.79	2.39	2.10	2.76	2.83
Millwrights	2.75	2.54	2.90	2.85	2.94	——	——	3.02	2.72
Oilers	2.26	2.04	2.47	2.34	2.45	2.05	1.45	2.51	2.33
Painters, maintenance	2.51	2.47	2.69	2.71	2.84	2.44	2.13*	2.89	2.72
Pipefitters, maintenance	2.73	2.66	2.80	2.87	2.90	——	——	2.96	——
Sheetmetal workers, maintenance	2.80	2.64	2.91	——	2.85	——	——	3.00	——
Tool and die makers	3.05	2.86	3.11	2.94	3.07	2.82	2.46	3.17	3.00
CUSTODIAL AND MATERIAL MOVEMENT JOBS Average straight-time hourly earnings									
Guards	2.28	2.03	2.37	2.43	2.35	2.11	1.55*	2.30	2.30
Janitors, porters, and cleaners	1.86	1.81	2.13	2.09	2.06	1.56	1.38	1.89	2.00
Janitors, porters, and cleaners (women)	1.38	1.64	1.79	1.95	1.86	1.38	1.14*	1.64	1.75*
Laborers, material handling	2.00	1.86	2.23	2.24	2.25	1.50	1.45	2.06	2.20
Order fillers	1.62	2.01	2.26	2.15*	2.27	1.85	1.59*	2.13	2.38
Packers, shipping	1.83	1.74	2.33	2.32	2.28	1.50	1.64	2.15	2.16
Packers, shipping (women)	1.30*	1.49	2.15	——	1.77	1.46*	——	1.79	2.03
Shipping clerks	2.30	2.14	2.49	2.52	2.24	2.02	2.15	2.26	2.39
Shipping and receiving clerks	1.95	2.11	2.36	2.24	2.40	1.82	2.14	2.21	2.45
Truckdrivers, light (under 1½ tons)	2.43	2.25	2.32	——	2.40	1.50	1.58	2.54	2.33
Truckdrivers, medium (1½ to and including 4 tons)	2.10	2.36	2.32	2.22*	2.51	1.79	1.39	2.78	2.65
Truckers, power (forklift)	2.40	2.11	2.38	2.28	2.43	1.85	1.42	2.28	2.29
Truckers, power (other than forklift)	2.48*	2.13	2.36	2.49	2.66	2.30	——	2.35	2.28
Watchmen	1.56	1.75	1.87	1.78*	1.87	1.54	1.24*	1.97	2.01

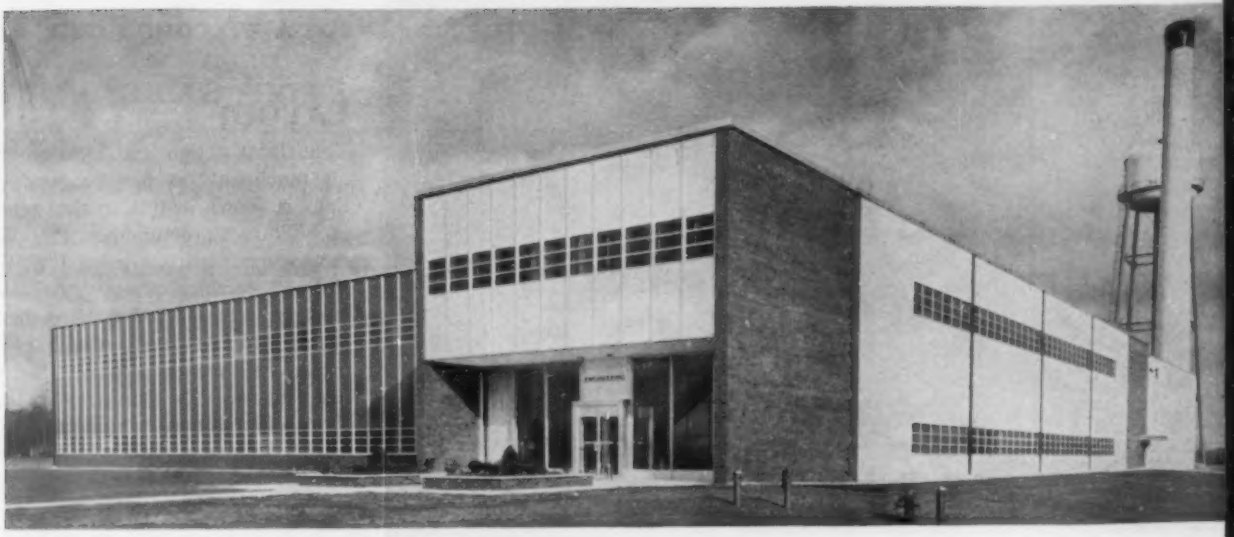
FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN

OFFICE, PROFESSIONAL, AND TECHNICAL JOBS Average straight-time weekly earnings									
Comptometer operators	73.50	63.00	72.50	68.00	76.50	74.00	58.50	71.00	78.00
Draftsmen, senior (men)	118.50	119.00	125.00	129.50	120.50	102.00	110.00	120.00	102.50
Draftsmen, junior (men)	86.00	90.00	95.00	102.50	93.50	76.00	79.00	92.50	82.50
Duplicating-machine operators	62.50*	55.00	——	——	72.50	60.00*	55.50*	61.50	57.50*
Key-punch operators	74.00	65.50	77.00	71.50	78.00	71.00	67.00*	67.00	76.50
Nurses, industrial (registered)	95.00	84.50	96.50	93.50	96.50	86.50	78.50*	89.00	100.00
Office girls	52.00*	56.00	59.00	——	61.00	62.00	48.50*	51.50	63.50
Payroll clerks	71.00	68.00	74.00	83.50	80.00	71.50	68.00	68.00	80.00
Secretaries	88.50	80.50	87.50	86.00	97.00	85.00	74.50	86.50	94.50
Stenographers, general	78.00	70.00	79.00	71.50	79.50	77.50	60.50	71.50	79.50
Typists, class A	76.00	65.50	77.50	73.50	81.00	67.00	60.00	71.50	76.00
Typists, class B	64.50	60.50	63.50	62.00	67.50	58.50	54.50	61.50	67.00

Highest Orbit Yet for Indirect Labor Pay

If the high cost of labor makes your blood pressure climb, you'd better lie down before reading the chart above. It's the first of this year's exclusive FACTORY reports on average indirect wages paid in cities across the U.S. Source of the statistics: the U.S. Department of Labor's Bureau of Labor Statistics.

You can use the statistics to put perspective on rates paid at your plant. And if you have an urge to see the shape of the trend line for indirect wages (it goes up, fast), look up previous BLS studies in FACTORY for June, July, and October 1959, June and September 1958, May and August 1957, May and August 1956 and 1955.



MAINTENANCE GETS A WELCOME HOME

Every day some 200 maintenance men, 80 engineers, and an assortment of visitors pass through the swank lobby (small photo) into the building above.

Called simply "The Engineering Building," the structure is the center of all plant engineering and maintenance activity at Johnson & Johnson's eastern Surgical Dressings plant near New Brunswick, N. J.

The first floor is occupied almost exclusively by the "plant engineering and maintenance department." The second level accommodates three allied engineering departments—project, package, and design and development engineering.

Says George Dickey, chief engineer: "We needed these facilities to do a better job. Engineering and maintenance are inseparable. And design and development belong together, too. We in this building are responsible for all plants and equipment. We don't just place a new machine on the production floor and walk away. We must maintain it—and constantly try to improve it."

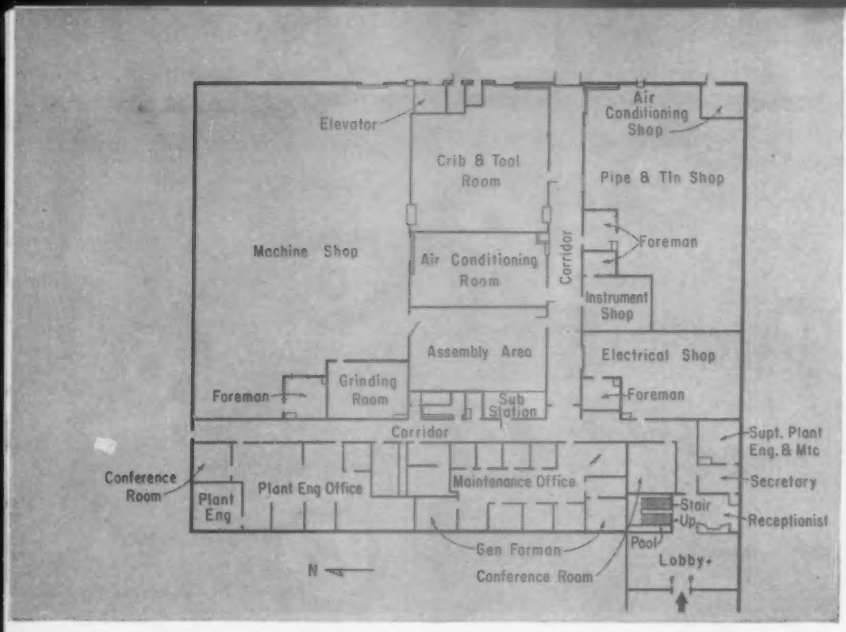
Is this engineering center *too* posh? No. It copies the design and architecture of the manufacturing areas it serves (FACTORY, May 1958, p. A30). Beautiful, yes. But also functional, with an eye to low-cost maintenance. It's a rectangular 160x205-ft. building. Floor area (two stories) is 67,500 square feet.

Much thought and preparation went into the design of this building. All engineering department heads had a hand in the planning. Says Wilbur Chinery, superintendent of plant engineering and maintenance: "We wanted to make this *the* most modern maintenance facility. Though we got a lot of basic information and helpful advisory literature from other plants, in the end we had to tailor the building to our own needs and operations."

Early planning was aimed at size. This called for astute forecasting. For example: Would burgeoning electronics demand more space over the years? Would design of future manufacturing buildings change service and maintenance patterns?

In the final planning stages, J&J used an inexpensive three-dimensional model to spot machine areas and plot plans for office clerical and administrative areas. When it came time to allot the square footage for maintenance stores, J&J was critical and objective. "Too many people save string in a vault," says Chinery. "They'll send a motor to the basement and trip over it for five years until they need it. Such storage and handling could cost more than a new motor." Yet here's another side: "Saving $120,000 this year may cost $300,000 next year to correct. You've got to look at it long-term."

What kind of building did such canny philosophies produce? To find out, turn the page for a photo tour.



. . . A WELCOME HOME

LAYOUT

Thoughtful design and location of all functional maintenance operations is shown in this stylized plan of building's ground floor. Simple rectangular plan, sectioned by "T-shaped" corridor arrangement, allows easy access to all departments. Special effort was made by architects to place all heavily populated areas (i.e., machine shop, pipe and tin shop, offices) near building's windowed perimeters.

LOBBY

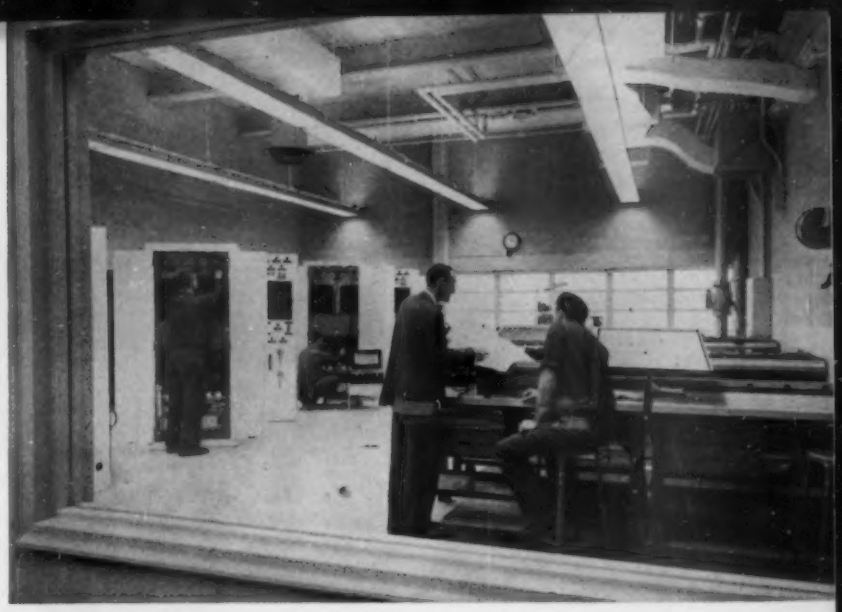
Everyone—visitor with briefcase, engineer with slide rule, or maintenance craftsman with lunch pail—enters or leaves the building through this dignified lobby. Futuristic, cantilever staircase leading to second floor engineering offices rises over large pond. Translucent wall near stairs glows red, yellow, or blue, according to control at reception desk. Door at right behind receptionist leads to ground floor shop area.

CORRIDOR

Access to ground floor shops is provided through this well-lighted, wide corridor. The walls here, and in offices and rest rooms, are painted block. Flooring of the entire first-floor area is 5-ft. monolithic concrete covered with vinyl asbestos tile. The door at far end of the corridor opens to the manufacturing area and other maintenance shops.

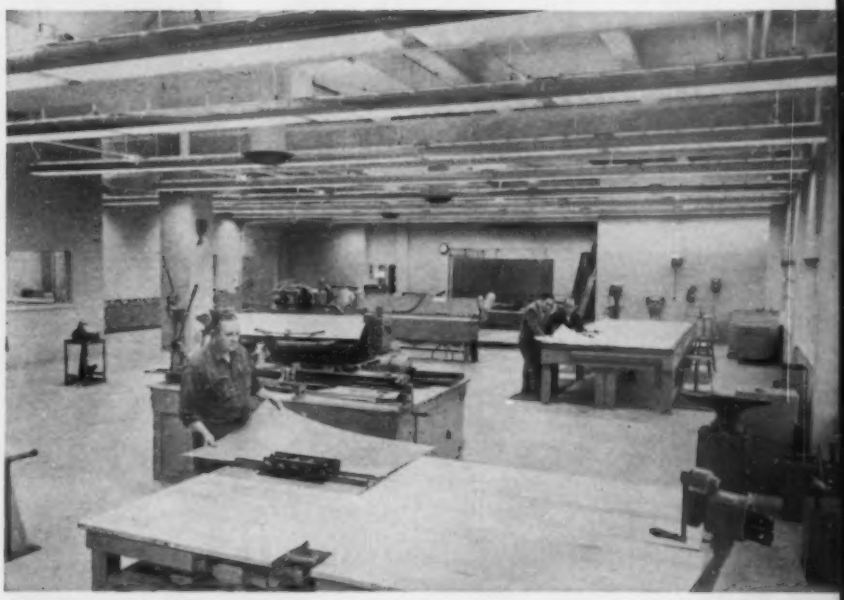
ELECTRICAL SHOP

A clear view of another well-lighted area—this time, the electrical shop —is captured through the "picture window" of the foreman's office. This high illumination level is maintained throughout the building. In the shop areas it averages about 175 foot-candles; in offices, about 150 foot-candles. Foremen's private offices are spacious, well equipped.



PIPE AND TIN SHOP

This well-equipped pipe and tin shop is a fine example of J&J's attention to visual detail at no sacrifice to efficiency. Walls here are painted in pastels, mostly yellow. Ceiling (metal pan deck with conventional poured concrete) is covered with sprayed asbestos fireproofing. Column near foreman's office (left) has steel cover with blue porcelainized-enamel finish. Uniform beige color of ceiling and overhead facilities pleases the eye, has high reflectance value.



STOCK CRIB

Strategic location of the stock room at center of the building allows easy shop access. Most services (air conditioning and assembly room on the ground floor; print and duplicating, and parts storage on the second floor) are concentrated in the building's mid-section. Machine shop is serviced from the window in the photo. Window in the back services crafts on opposite side of building.

Turn the page

. . . A WELCOME HOME

MACHINE SHOP

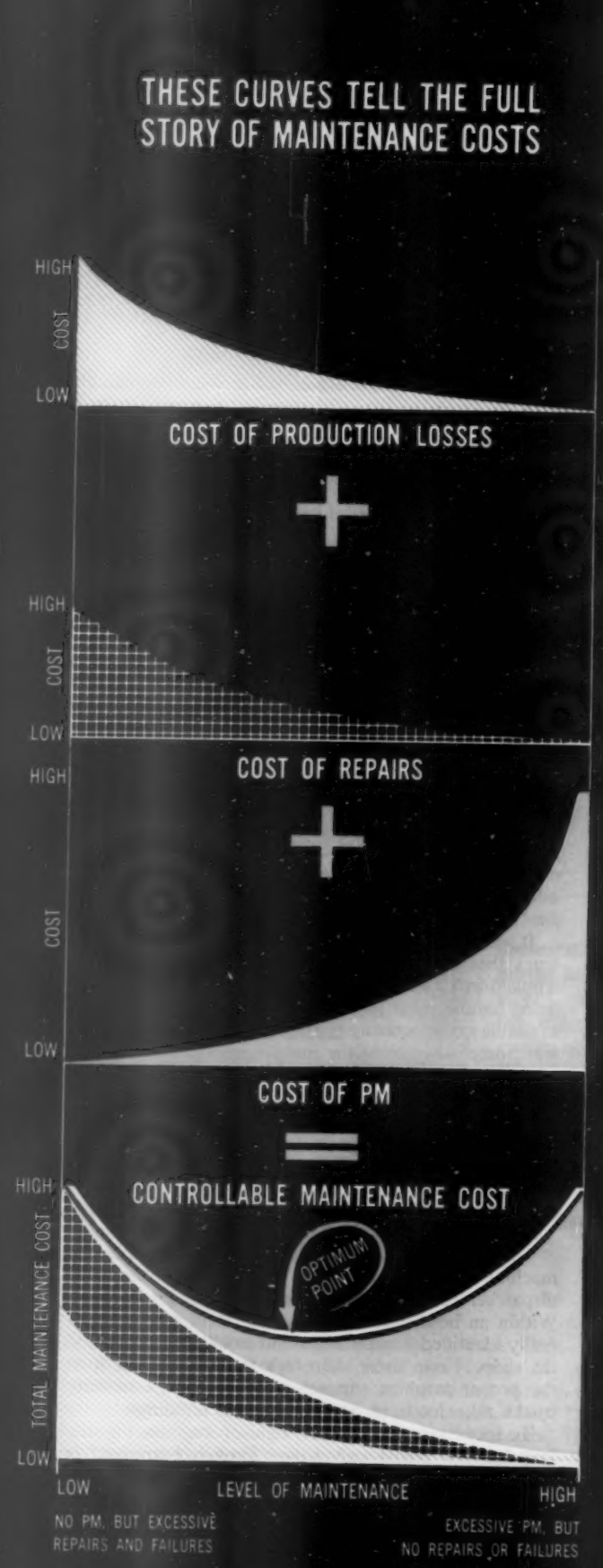
Sprawling machine shop (largest single shop area in building) is deftly laid out. Machines with similar operating hazards are grouped together. All grinding is done in separate room, away from destructive dust of main shop. Most of J&J's special machinery is built in this area. Heating and ventilating units are suspended overhead. Wall running along background is continuous aluminum sash with blue-tinted plate glass.

LUNCHROOM

Spotless, attractive lunchroom is located on second floor away from shop operations. Just a short jog "upstairs," most men prefer it to the plant's main cafeteria in adjacent building. Vending machines serve hot and cold drinks and some foods to supplement lunches brought from home. Maintenance men have other exclusive facilities on the second floor, such as locker rooms and washroom with showers.

FOREMEN'S OFFICE

Impressive décor of private, first-floor office reflects stature afforded plant's two general maintenance foremen. Spread out between each foreman location is the maintenance operations office. This clerical center, 30 feet wide, has a continuous sash, with landscape view, extending along the full front of the building.



A Clear Look at How PM Pays off Best

PREVENTIVE MAINTENANCE can be overdone—or underdone. Question is, what's the point of best economic return?

These charts give the answer. (It isn't given in quantitative terms, but it does show the variables that affect cost of maintenance.) With these charts as guides, you can work out quantitative answers for your own plant.

This graphic illustration of maintenance cost was presented by Jack F. Thornton in his paper on "Preventive Maintenance at Work" at the 11th Annual Plant Maintenance & Engineering Conference (Philadelphia) Jan. 27. Thornton is general maintenance superintendent, Natural Gasoline Department, Phillips Petroleum Company, Bartlesville, Okla. Several years ago he was directed to set up a PM program for 34 natural gasoline plants and one fractionating and special process center. He had to satisfy himself and his company that PM could be profitable. His problem: What's the best level of maintenance? For the answer, we've capsulized his views below.

THORNTON'S REPORT

The prime purpose of PM is to achieve a level of maintenance—on all facilities—that gives optimum quality production at lowest unit cost. This level is set by the nature, quantity, and frequency of three elements: operating maintenance, shutdown maintenance, PM overhaul.

The charts at left show the relation of the economic factors that determine the most profitable level of maintenance. Maintenance level (horizontal axes) is plotted against costs (vertical axis). These charts have no graduated scale, and don't need one for our purposes here.

The first two charts show the effect of maintenance level on costs of production losses and repairs. As maintenance level goes up, these two costs go down. The third chart graphically introduces the cost of PM, with cost directly related to level of maintenance.

Optimum level is somewhere between the two extremes. But where? The bottom chart adds costs of production losses, repairs, and PM. This sum is called the controllable maintenance cost (uppermost white line in bottom chart). Desired level is where controllable cost is the least. **This chart shows that controllable maintenance cost is lowest where cost of PM approximates the sum of the costs of repairs and production losses.**

You needn't be precise in locating the optimum point. There's small penalty in hitting a point, say, 10% either side of it.

NOW THIS IS COMMUNICATIONS

Look at the problems a good system solved:

SOLVED: *the problem of establishing 24-hour-a-day contact between six scattered warehouses and plants, plus company vehicles traveling between locations.*

SOLVED: *the problem of keeping a fleet of material-handling trucks working three shifts a day in any kind of weather.*

SOLVED: *the problem of making radio communications so dependable that a new multi-million-dollar machine shop now operates from a steel stockpile over half a mile away.*

SOLVED: *the problem of putting fast intercom systems in the hands of all executives, production control, shipping, and other personnel who can use them effectively.*

SOLVED: *the problem of eliminating confusion and delay in steel mill crane operations—accentuated by newly enclosed crane cabs.*

SOLVED: *the problem of overriding excessive mill noise that crippled ordinary voice communications and added to money-wasting downtime.*

SOLVED: *the problem of servicing some 53 different communicating systems without having to send back units or components to the factory for repair.*

This is the story of a complex communications system in a big organization. The organization (Timken Roller Bearing Company, Canton and Gambrinus, Ohio) couldn't operate without it.

But don't let size and complexity scare you off. This company has a complex radio communications system because it has lots of communications problems. The system is a collection of small systems, each aimed at solving a different problem with highest possible efficiency. And each problem resembles one you might have in your own plant, be it middle-sized or small.

How did Timken reach this high level of communications efficiency? Part of the reason, no doubt, has been the sponsorship of Henry Timken, now chairman of the board, who has long had keen interest in two-way radio and a conviction that widespread use of electronic communications in industry is inevitable. But enthusiasm for fast communications actually came from all levels of management and supervision at Timken. Success of initial electronic ventures was such that now little "selling" is needed to begin new systems.

One part of the Timken communications story ironically lies in the pioneering the company did in 1946 in the use of straddle trucks for hauling steel stock.

One weakness of the straddle truck set-up became apparent in the first few months of operation—it's more like a fleet of tug boats than trucks. Timken found it's not easy to keep straddle trucks working effectively unless you solve the communications problem first. Various methods were tried—written work orders, code-colored lights on the roof of the truck dispatch office, etc. The first two-way radio system Timken purchased for company use was installed in the original straddle trucks for keeping in touch with the truck dispatcher's office. The move improved material-handling efficiency immediately. Result: As new straddles were added, they were automatically radio-equipped. The fleet is now double its original size—totals 18.

It was the performance of the radio-equipped straddle truck that led to the adoption of a brand-new idea by Timken in 1956. Operations in the Canton plant were being handicapped by lack of space. The only readily available manufacturing space was in a big steel products warehouse adjacent to the machining area. If the steel could be cleared out, the three floors of the warehouse could be converted into additional square feet for other use. But the only area available for steel storage was at the Gambrinus plant, half a mile away.

Timken management was convinced the risk was worth the rewards. The warehouse was converted for other needs. The storage yard at Gambrinus (where Timken does most of its heat treatment) was enlarged.

Today any foreman in the Canton or Gambrinus machine shops can pick up a phone and ask the truck dispatcher (at Gambrinus) for a specific lot of steel. Within an hour (and often less) the steel will be in an easily identified bundle at a small stockpile just outside the shop. From there shop fork trucks transport it to the proper machine. In some mill buildings straddle trucks take loads in and out of the buildings.

To speed matters, a private right-of-way about a mile long between plants, called the "Timken Turnpike," is leased to cut interference with public highway traffic.

Communicating time is kept at a minimum by the extensive use of code numbers for vehicles, delivery areas, and storage areas. The material-handling dis-

Material handling dispatcher (left) is at the hub of all Timken intra-plant material move requests. Regardless of weather, he can talk to any of 32 radio-equipped straddle, fork, or utility trucks. With the same system he is also in frequent contact with walkie-talkie-equipped **materials supervisors (right)** as they roam scattered steel storage areas.

Interplant traffic dispatcher (left) operates powerful radio system that speeds communications between **company trucks (right, top)**, service vehicles and **plant security cars (right, bottom)**. In addition to traffic control base station at Canton, Timken has supplemental transmitters at remote plant cities. This way, no vehicle traveling between plants is ever out of touch with central control or dispatcher's weather report and job assignments.

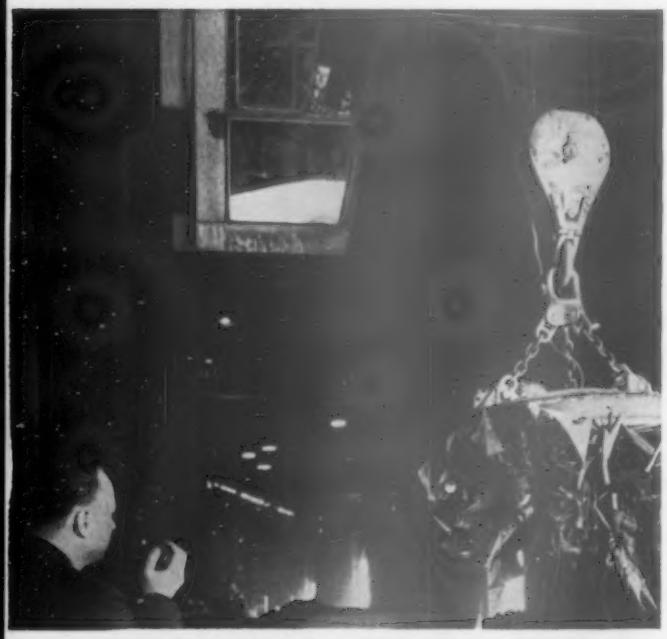
Communications maintenance headquarters (left) monitors operations of both systems above—ensures fast, efficient service. Shop has complete repair facilities and supply of spare parts for almost every electronics unit in service at Timken plants. Around-the-clock contact with **field repair trucks (right)** is maintained through a tie-in with the plant's traffic control network and remote control microphones.

patcher's 60-watt transmitter is normally on the air for about two hours out of the 24, while the number of transmissions between all elements in the system averages about 7000 in a typical day. Approximately 1500 loads of steel are moved daily. A total of 32 radio-equipped vehicles, including locomotive cranes, lift trucks, and service trucks, are all connected through this efficient material-handling system.

Timken has squeezed many other benefits from this unique system. Driver paperwork has been virtually eliminated in material transfer. Supervisors check out two-way belt-mounted walkie-talkies when they want to make an on-the-spot check with the dispatcher at the storage yard. The dispatcher at all times knows the location of every straddle truck, how much work is scheduled ahead for each, and how many transfer requests remain unassigned. Also, any yard maintenance worker can call the dispatcher by phone to request a truck to haul bulky maintenance equipment.

Turn the page

Five different closed-circuit television systems enable mill and furnace operators at Timken plants to monitor production quality without strain.



Twenty-two wall-mounted intercoms, scattered throughout mills, make it easy to talk with crane operators secluded in air-conditioned cabs.

THREE-STATE TRAFFIC CONTROL

Thus far we've been talking about only one of Timken's communications systems. Actually, the company has 53 different systems, 10 of which use radio or high-frequency carrier current transmission. A second two-way radio system for traffic dispatching on a separate frequency takes care of interplant traffic and plant security needs. Transmitters at four of Timken's six central Ohio warehouses and plants pretty well blanket the triangle-shaped area bounded by Canton, Bucyrus, and Columbus. The Columbus-Canton leg of the triangle is longest—about 125 miles. The base station at Canton is a 600-watt unit with a double-beam directional antenna aimed down the legs of the triangle. Stations located at Wooster, Bucyrus, and Columbus operate with 120-watt transmitters. All base stations can receive Canton messages faithfully regardless of weather conditions, but over-the-highway trucks (with less sensitive receivers) sometimes have reception trouble as they travel in hilly areas remote from Canton. When this happens, the nearest base station relays Canton's message to the truck.

"WATCH OUT FOR ICE ON 23"

Since initial installation of the traffic dispatch system in 1959, Timken has increased truck ton-miles per day, eliminated empty turnarounds, and improved driver efficiency. Road conditions are carefully watched. When traffic or bad roads make one route undesirable, the first Timken truck to spot the difficulty radios word to the nearest base station and all involved interplant traffic is rerouted.

The same transmitting system is used for plant security vehicles. Remote control facilities at the Gambrinus and Canton plants enable plant police and safety departments to use the transmitter to contact any of their vehicles. Included in the system are several radio-equipped plant protection automobiles, fire trucks, and an ambulance. The traffic dispatch office is staffed only during the day shift, so the plant protection headquarters handles night traffic dispatching as well as its own messages.

DON'T PHONE—USE THE INTERCOM

Fifteen different intercom systems (most of them seven-station units) connect sales, shipping, and production control offices in the different plants. An incoming customer phone-call request for shipping information can be answered by sales department personnel without hanging up the telephone or leaving their desks. All they have to do is call the information source on the intercom. Timken now has a total of 85 of these low-power intercom stations.

High-power intercom systems are used as the backbone of communications in the steel and tube mill area. One system, linking soaking pits, rolling mills, and the wire mill at Canton, extends over an area five city blocks long. Twelve stations are located at key operation centers along the length of the mill. Each station consists of a microphone, selector panel, amplifier and loudspeaker. When a breakdown occurs in one part of the mill, the operator gets to the nearest intercom, selects the stations to be called, describes the trouble so that maintenance personnel can bring proper equipment, and warns other parts of the mill operation to divert material flow until the trouble is corrected. Volume is high enough to override mill noise. And the system is used for routine paging of supervisors and key personnel. Six conversations can be carried simultaneously.

Two other communications methods have paid off handsomely. Timken uses municipal-type fire-alarm

and police-call boxes to keep tight control over emergencies. And since 1952 it has been using closed circuit television (it now has five different TV systems) to monitor furnace operations. One tube conditioning furnace (under control of operators conveniently located 300 feet from the camera) has been in operation for over five years.

DON'T WAVE—USE THE PHONE

Six carrier current systems have eliminated arm-waving, hollering, and whistle signals between crane operators and hitchers in Timken's mills at Canton and Gambrinus. When crane cabs were enclosed and air conditioned several years ago the old methods of signaling would no longer work. Now some 22 wall-mounted microphones make talking to one of the 17 different crane operators as easy as operating an intercom.

Timken has put the new "citizens' band" allocation (FACTORY Sept. '59, page 272) to work, too. Any of the plant's five intraplant locomotives now can do switching right next to a key crossing without energizing the warning lights and tying up roadway traffic. When the engineer plans to cross the roadway with any part of the train, he presses a switch energizing a small citizens' band transmitter on the locomotive. A receiver in the crossing control box starts the flashing lights, keeps them on until the "all clear" signal comes from the locomotive.

GOOD MAINTENANCE—KEY TO SUCCESS

Timken has a total investment in communications equipment and auxiliaries nudging $250,000. Much of it must operate 24 hours a day. Even short-time failures or malfunctions are costly. (For instance, typical industry figures for straddle carrier and driver time runs about $10 an hour; locomotive time, up to $75 an hour; over-the-highway trucks, about $20 an hour.)

So the time saved by pulling a defective unit and replacing it with a plug-in spare (5-10 minutes), instead of tying up the vehicle while repairs are made, can total thousands of dollars a year.

All communications equipment is maintained by a 4-man staff; well trained through experience and personal interest in radio and electronics. All have radio operator licenses. All are on a salary basis. They do not answer maintenance calls that should be handled by the plant's electricians. But occasionally they may be called in as consultants.

Early in the game Timken management saw that communications facilities and experience needed to be treated as a common pool from which any department could draw. To convince supervision of the advantages of fast communications equipment, Timken has made it easy to add new facilities as needed. Maintenance labor, test instruments, spare parts, and spare units are charged against a general fund. Only original system components are charged against individual operating divisions. This encourages interchangeability and standardization and gives the communications maintenance supervisor a strong voice in equipment purchase decisions. The Communications Maintenance Group reports only to the company office manager.

And . . . at Timken

• Communications maintenance staffers are all on 24-hour call. But spare transmitters, plus topnotch maintenance, keep night calls down to two or three a year.

• Maintenance men keep up-to-date maps and terminal board diagrams of the Bell system lines inside the plants that are used for remote operation of two-way radio systems. When there's trouble, they offer maps and assistance to telephone repairman.

• A complete auxiliary transmitter, antenna, and power supply are maintained alongside each of the two key transmitters. All incoming and outgoing calls on both systems are monitored at the communications maintenance shop. Service men can be on their way to repair a faulty transmitter before the dispatcher knows anything is wrong.

• Tube and component life is much better since electronic voltage regulators were installed in the power supplies of all base station transmitters.

• Except for transmitters, no preventive maintenance is done on communications equipment until it fails. Base station transmitters get complete annual check-ups. Both mobile and base units get periodic frequency checks required by FCC. When any mobile unit fails and a quick check of tubes or connections doesn't show up the trouble, the unit is replaced with a spare and taken to the shop where it gets a thorough overhaul. Tubes showing deterioration are replaced, major components tested and inspected. When serviced, unit goes into spare stock.

• The material handling dispatcher's office makes use of many clever ideas: A foot switch for the transmitter and a no-hands Bell system telephone and speaker leaves the operator's hands free for writing and reduces fatigue. Material move requests are written on strips of white pressure-sensitive tape and mounted on one of two "awaiting assignment" boards, according to whether the material to be moved is located at the Canton or Gambrinus plant. When a truck in the area of the load reports in for a job, he gets instruction from the dispatcher, and the corresponding move order tape is shifted to that truck's line on the proper "assigned jobs" board. When a driver reports the job is finished, the time is marked on the tape, then it's filed.

• A radio-equipped truck with compartments stocked with essential spare tubes parts is a key factor in fast service. Tubes are kept in caddies corresponding to the type of equipment being serviced.

STOP

Wasting time and energy at your management meetings? For a stimulating look at how to conduct more effective and rewarding meetings, turn fast to page 210.

A statement from Behr-Manning Co.: "*Our Burroughs computer processes our customer order data in 1/50 the time*"

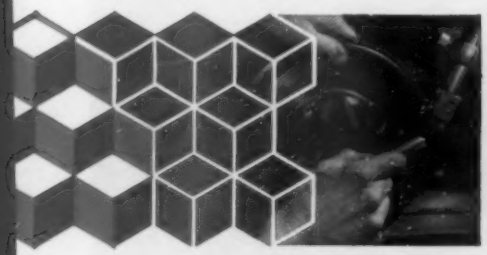
Behr-Manning's Philip Doherty (left) meets with members of his group at the Datafile.

Edwin C. Evans, Vice President and General Manager of Behr-Manning Co.

"Our Burroughs computer processes our customer order data in 1/50 the time... and provides our management with up-to-the-minute statistical reports for the control and planning of our business."

EDWIN C. EVANS

Vice President and General Manager
Behr-Manning Co.



Nearly 40,000 different products are manufactured by Behr-Manning Co., of Troy, New York, a division of Norton Company. These products have use in almost every manufacturing process... from the making of cars to the shelling of peanuts. The products are of three main types: coated abrasives, pressure sensitive tapes and floor maintenance products. Behr-Manning, with its parent company, the Norton Company, is the largest abrasives enterprise in the world, and Behr-Manning's cellophane and other pressure sensitive tapes, sold under the "Bear" Brand are quality leaders in their field.

Behr-Manning's vast selection of products are stocked and shipped from the factory warehouse and from 16 branch warehouses across the country. Their products are purchased by countless different types of customers through every major channel of distribution.

The company, which began as a sandpaper business in 1872, now has 3,000 employees. As Behr-Manning's line of products and list of customers grew, their record keeping and accounting procedures also became extremely complex. In November, 1958, they installed a Burroughs 205 electronic data processing system to solve their paperwork problems.

Behr-Manning's decision to purchase a Burroughs 205 was preceded by considerable investigation. Vice President and General Manager, Edwin C. Evans, states, "We first organized a 6-man study team. The group's job was to determine whether or not a data processing program would help us, and if so, to recommend which data processing system would help us most. When we decided to enter electronic data processing, the group prepared a detailed description of our particular requirements. We settled on Burroughs equipment because the 205 best satisfied our specific needs. Furthermore, the high capacity, low-cost random access Datafiles were especially suited to our application."

The computer soon took over a number of complex clerical functions... in actuality, 19 different computational assignments, from factory payroll to budget reporting. The computer's capacity enabled it to do all of this work in only 10 hours per week.

Despite the magnitude of these jobs, this was not the chief reason for acquiring the 205. Behr-Manning's most important need is a process called "order entry," which literally automates the entire sales-inventory-billing-report cycle.

The source of all Behr-Manning operations is the customer order, which is also a source of a mass of paper work. It must be edited, analyzed and reproduced prior to completion of processing.

"All order entry, from every branch, can be done by our 205," states Philip Doherty, Behr-Manning's Manager of Operations Analysis and Planning. "We process thousands of orders a day. An original order is picked up just once at a receiving location and all the work is done automatically in the system. An order coming in from a branch office is transmitted in minutes to headquarters by private wire, quantity and item data are automatically fed to the computer, and return wire messages make stock status and shipping information instantly available to the branch office."

In addition to processing the order, the 205's magnetic tape Datafiles, each having a capacity of 20,000,000 digits of information, hold many thousands of different customer and product records. When an order is entered in the 205, the computer locates the appropriate customer and product records, then issues either a production order or shipping instruction. It also automatically prices the order and issues the invoice. Upon completion of a customer order, the computer automatically issues factory orders to replenish the stock level of the factory or branch warehouse.

The statistics accumulated by the 205 are then prepared in numerous different reports which are distributed either daily, weekly, monthly or quarterly in a digested form for Behr-Manning management. The reports include information on sales, finance and production. Previous to the 205 these statistical analyses required as long as three weeks to prepare. Now, even the most involved report can be issued in 48 hours, and if information is needed more quickly, it can be obtained by inquiring through the computer console. In such cases, specific replies are typed automatically by the printer.

"These up-to-the-minute reports," says Behr-Manning's President, Elmer C. Schacht, "are invaluable to us in the planning and control of our business. The information obtained from one waste report alone should save us thousands of dollars a year. In addition to improving the speed and accuracy of our own operation, installation of the 205 benefits our customers with the fastest possible service."

Behr-Manning originally leased their 205 computer, but after about nine months of use, they decided to purchase it. Vice President Edwin C. Evans points out, "By June, 1959, it was obvious that our 205 would accommodate all of our 'order entry' procedures plus many of our other data processing needs. So at that time we purchased the 205 outright. The equipment had proved itself and it made economical good sense to own it rather than rent it."

Like the people of Behr-Manning, hundreds of other industrial and business users are confirming the same experience Burroughs complete line of electronic data processing equipment is backed by a coast-to-coast team of computer specialists, all eager to tell you how Burroughs can help in your business. For additional information, write General Manager, Data Processing Systems Group, Detroit, Michigan.

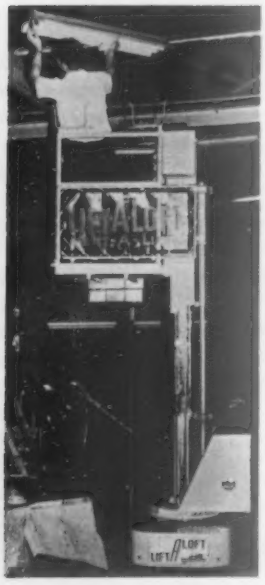
Burroughs Corporation

"NEW DIMENSIONS/in electronics and data processing systems"

For more facts Circle 440 on Reader Service Card

FACTORY EQUIPMENT NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.



SAFE, COMPACT ONE-MAN . . .
OR THREE-MAN LIFTS . . .

Move Under Own Power

And once on the spot, the 4-mast, battery-powered model (right) rotates to cover over 700 sq. ft. of overhead area. Both this model and the smaller Vert-a-Lift (left) are self-propelled, platform-operated for fast, efficient maintenance. Safety features: (1) Platforms lower close enough to floor (18 in. for small model) so operator can step on without ladder or other devices; (2) dead man brakes.

Built-in water lines, for cleaning lights, walls, ceiling, windows, and machinery, can be used while platforms are extended. Platforms on both models swivel 360 deg. The one on the 4-master, with 21 sq. ft. of non-slip floor space, reaches out 15 ft. to save hours of rigging in hard-to-reach areas. Three men can work safely on it. The 4-master comes in heights to 50 ft. Small, compact model, for operation on either a-c or d-c, has platform heights to 20 ft. *Lift-A-Loft Co.* (Circle 88).

89—Digital Computer is for on-line process control or intermittent off-line use. Monitors itself and input-output equipment for random errors and component failures. Memory drum stores from 8000 to 16,000 words. *Leeds & Northrup Co.*

90—Tote Boxes of rigid fiberboard, can support 150 times their own weight without distortion. Fireproof, will not tarnish copper, brass, etc. Available in three sizes to 24x30 x15 in.; capacities, 1/100 cu. ft. to 5 cu. ft. *Beacon Boxes, Inc.*

91—Metal Conveyor Belt, a modification of basic flat wire belt, is able to turn right or left as well as run on straightways. Flexibility of mesh permits inside turning radius 2½ times belt width. Available in 2- to 48-in. widths. *Ashworth Bros., Inc.*

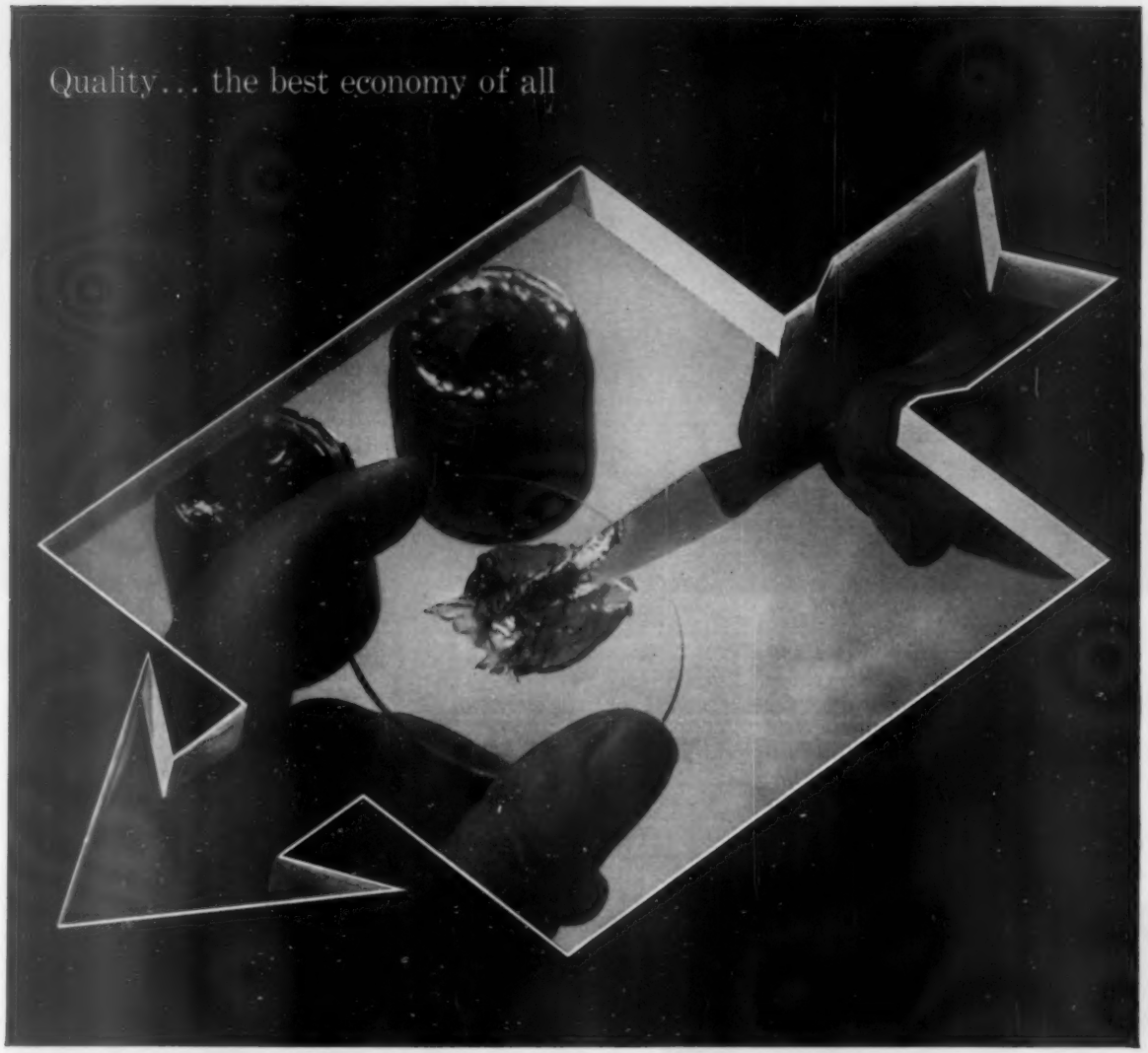
92—Microfilm Package supplies all parts needed to establish microfilm department at relatively low cost. Kit includes camera for filming large engineering drawings rapidly and economically, film processor, and film. *Remington Rand.*

93—Machine Tool Tape Control system permits up to 0.0001-in. tolerance in machining templates, and to 0.002-in. tolerance in contour boring and turning operations, in increments of 0.000025 in. Automatic rewind. *Bendix Aviation Corp.*

94—Foam Spray Gun applies linings and coatings of multiple component materials quickly. Roller-mounted reservoir meters materials to gun in exact proportions. Gun delivers up to 19 lb. per min. at up to 200 psi. Low cost. *Binks Mfg. Co.*

95—Remote Control Tractor, with 100-ft. range, permits one man and tractor to work as order-picking team. Operator activates tractor with radio transmitter. Also acts as walkie or rider without radio. *Automatic Transportation Co.*

Turn the page



It's a multipurpose grease . . . but *how* multipurpose?

You can't "feel" the answer. Any "multipurpose" grease you buy is a compromise. Lubrication engineers say it *can't possibly be* the best lubricant both for high speeds and low loads . . . and for low speeds and heavy loads. It's *got to be* somewhere in between, so that it can do both jobs fairly well.

What you should do is decide on *which* multipurpose grease is best for you. This is a decision for an expert team—you and your Sun representative—because you have to consider many variables.

We feel, justifiably, that one of Sun's Prestige Multipurpose Greases is designed with that wide range of applications you're looking for. They last longer under pressure, water, heat, and other abuses. They bear investigation. To start enjoying the real economy of quality, call that Sun man today—or write direct to SUN OIL COMPANY, *Philadelphia 3, Pa. Dept. F-4. In Canada: Sun Oil Company Limited, Toronto and Montreal.*

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

Jointless Seal With Smooth Bore

Polyethylene pipe and fittings for plumbing systems are not news, but the heat-fusion method of joining them in seconds is. An American licensee is using this British "Polyfusion" technique with its fittings. (The "Vulcathene" line resists most strong acids, all alkalies, inorganic liquids, salts; is unaffected by water and mercury.)

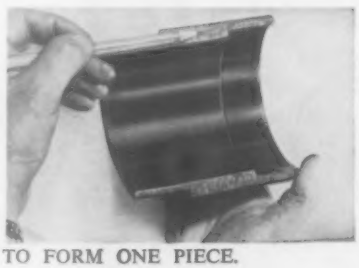
This technique uses a heating tool to join pipe and sockets into one homogeneous piece with smooth bore inside piping. Double thickness of juncture point is far stronger than pipe. Technique demands no special skills. Here is a summary of the method in three steps:

1. When heating tool reaches 450 to 500 F., fitting socket (with rubber compression ring around edge) is pushed over male end and pipe over female end to melt contact surface (top photo).
2. Melted socket and pipe push together to preset mark (center).
3. Compression ring exerts pressure on softened end of socket in contact with pipe. Socket and pipe fuse (bottom).

Fittings and pipe are available in standard sizes, cost less than rubber-lined steel, Duriron, or stainless steel. *American Vulcathene* (Circle 96).

HEATING TOOL SOFTENS . . .

SOCKET AND PIPE . . .



TO FORM ONE PIECE.

Air Clamps Grab and Release in a Flash

Are manually operated "C" clamps slowing down your machining make-ready and put-away time? Then take a look at these air-operated clamps that grab fast, grip firmly through machining operation, then instantly release. You can choose a series with manual sleeve valve or one with an integral solenoid valve for automated applications. Comes in two lines—a heavy-duty series for exceptional strength and durability, or a low-cost line for average applications. Clamp shown has 0- to 6-in. adjustable opening with 3¼-in. depth. Others have openings of 7, 8, and 9 in. All clamps have a number of optional clamping ends. *Airmatic Valve, Inc.* (Circle 97).

98—D-C Variable Speed Drive uses silicon rectifiers to withstand 300% greater surge with safety. In three sizes for ⅓₀₀- to 1½-hp. motors. Features instantaneous response; 50:1 speed ratio; remote or local control; dynamic braking, reversing. *Magnetic Amplifiers, Inc.*

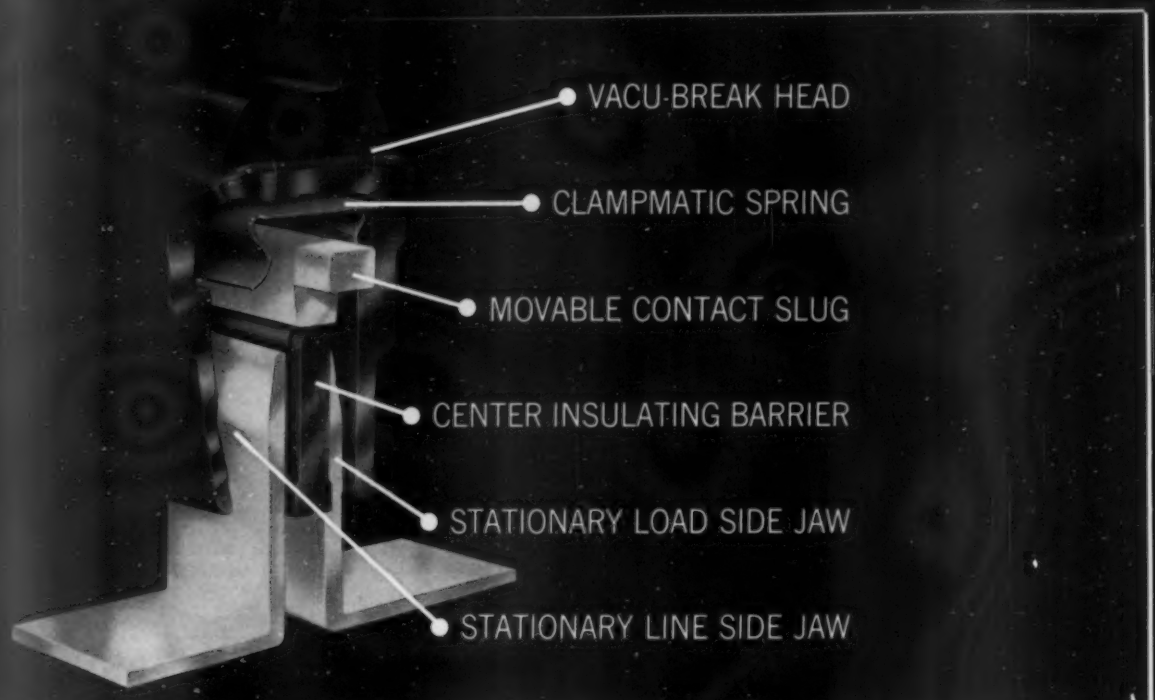
99—Silent Paging System sends impulse through pocket-size personal receiver that vibrates. Person thus alerted phones control console to receive message. Low-cost "Vibacall" works in any noise level. Unaffected by adjacent installations. *AC Spark Plug Div.*

100—All-Weather Expansion Joint eliminates cracking in seams of terrazzo tile and concrete flooring. Flex-Tite, made of rubber compound and metal, expands or contracts with heat changes. Resists traffic and chemicals to preserve bond of floor. *Firestone Tire & Rubber Co.*

101—Data Collector gathers, on punched tape, payroll records, inventory information, costs and scheduling operations for use by computers. Data is fed by manually operated dials to reduce error. Typewriter-size unit cuts labor of collecting data. *Control Data Corp.*

102—Mobile Scale Truck gives net weight of load (to 3000 lb.) being transported. Eliminates multiple handling of loads, thus saves manpower, moves goods faster. Scale is an integral part of the custom-built hydraulic footlift truck. *Lewis-Shepard Products, Inc.*

Turn the page



THE INSIDE STORY...

Why switches last longer with clamped pressure contact and Vacu-Break arc control

This BullDog Vacu-Break® Switch Head is the reason why Vacu-Break switches stay in action longer.

The unique Clampmatic® spring clamps the contact slug firmly between the line and load jaws . . . provides a virtual bolt-tight connection! This clamped pressure contact prevents overheating while in the "on" position—and as the switch moves to "off," the spring speeds the break. Both features mean longer switch life and improved performance.

Equally important to longer switch life is the action of the Vacu-Break head. Arc chambers enclose the switching contacts. When contacts are broken under load, arcs are smothered quickly. Pitting and burning are cut to the absolute minimum, thereby minimizing maintenance.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

For Safety's Sake Buy Vacu-Break

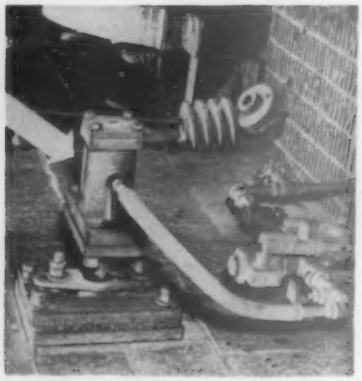
BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

KEEP PACE WITH ELECTRICITY

Vacu-Break switch units with clamped pressure contacts are available in BullDog Safety Switches, Switchboards, Vacu-Break Power Panels and Bus Plugs. They cost no more and give your customers the maximum in safety and performance. See your BullDog field engineer.

For more facts Circle 442 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

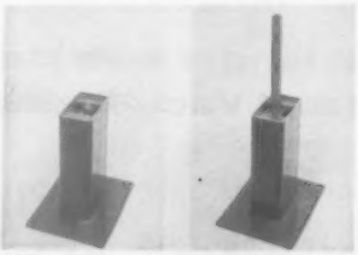


103—Air Rapper, in one-piece design, eliminates 80% of maintenance problems on precipitators and dust collectors. No assembly bolts to stretch and shear, no separate striking plate to leak air from housing. Special exhausts minimize wear. *National Air Vibrator Co.*

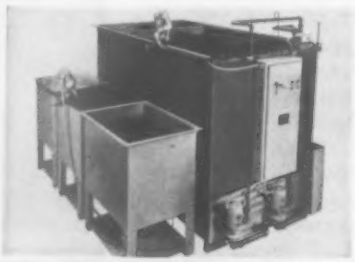
104—Motor Starter combines central transformer, switch or circuit breaker and contactor. Meets latest JIC specs. Completely safe: Door must be closed before starter can function. It's available in NEMA Type 12 enclosure, in sizes 1 and 2. *General Electric Co.*

105—Portable Plategage makes precise measurements of plating or coating-thickness from 0.0001 to 0.015 in. Works on flat or contoured surfaces, measures to $\frac{1}{16}$ in. OD or ½ in. ID. Direct-reading meter. Operator needs no skills. *Dyna-Empire, Inc.*

106—Tractor-Shovel has 77½-hp. heavy-duty gas engine, four-wheel drive and brakes, 3000-lb. capacity for tough digging assignments. Safety features: Boom forward to protect operator; full visibility of bucket; ladder for easy mounting, dismounting. *Frank G. Hough Co.*



107—Anchor Bolt and Well is flexible and retractable—bolt moves ½ in. in all directions and remains vertical. Low-cost unit complete in itself—requires no attachments. It's sealed from concrete and débris. Equipment can be removed and replaced. *Paton-Reynolds Co.*



108—Chromium Waste Destroyer neutralizes up to 600 gph. of liquids to permit safe dumping directly into municipal sewer system or streams. Automatic, simple to operate, low-cost, needs no contractors to install. Ideal for small plants. *George L. Nankervis Co.*

Turn to page 130

COSTLY PRODUCTION MARKING PROBLEMS?

The solution is at your fingertips from Blaisdell—leading manufacturer of specialized industrially graded markers and writing instruments.

A SPECIFIC PROBLEM . . .
OR A COMPREHENSIVE SURVEY . . .
both are as close as your local Blaisdell factory-trained representative.

Over 600 surface engineered markers plus hundreds of job rated writing, reproducing, electronic tabulating and erasing instruments to meet the exacting specifications of your factory and office systems.

A PRODUCT FOR EVERY PURPOSE—FOR EVERY MARKING AND WRITING SURFACE
Available at better stationers everywhere.

Contact us *NOW* for the name of your local Blaisdell representative.

Representatives in these leading cities.

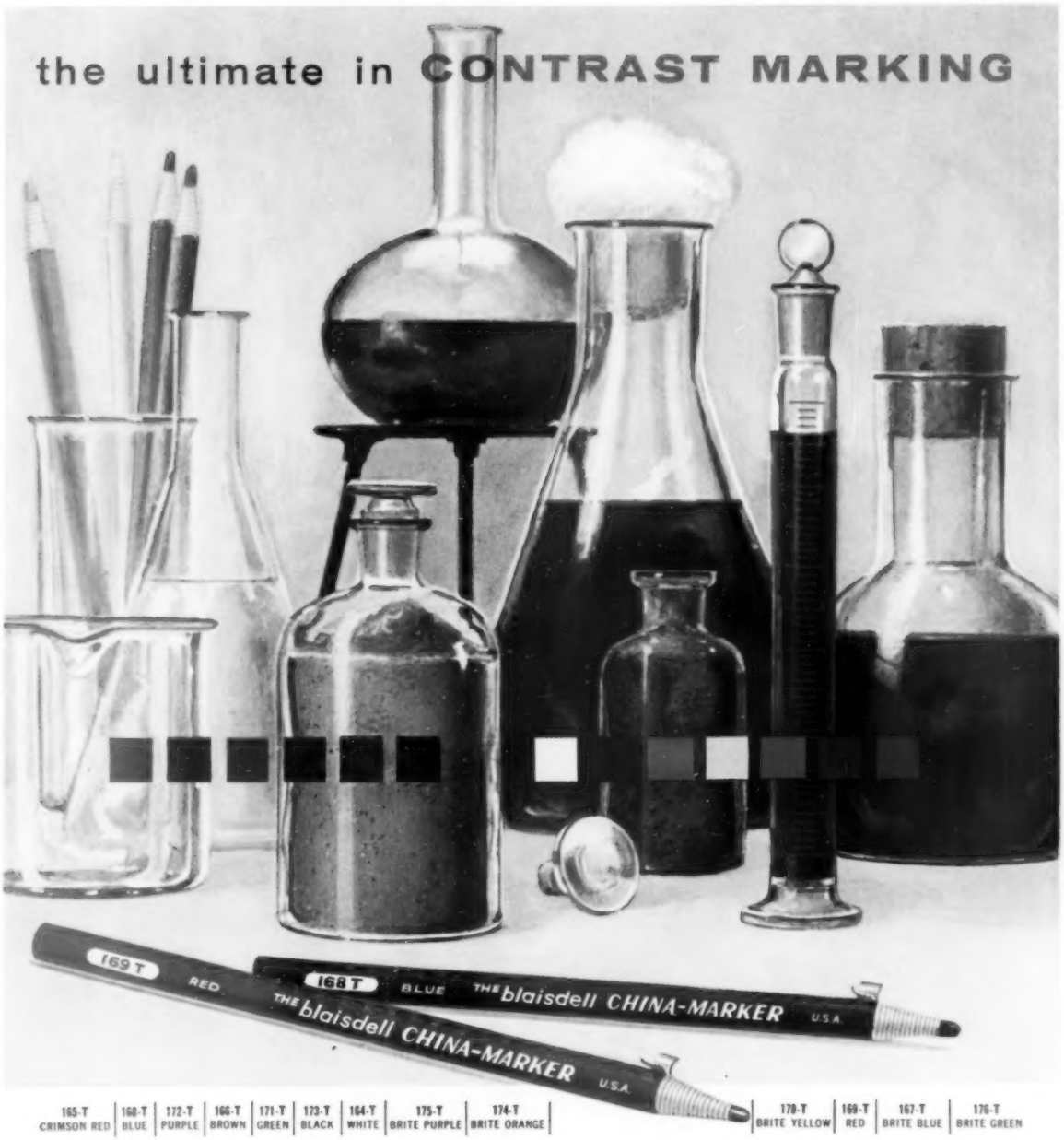
CHICAGO
BOSTON
DETROIT
SAN FRANCISCO
DALLAS
NEW YORK
ATLANTA
LOS ANGELES
CLEVELAND
PHILADELPHIA

Also Toronto, Mexico City and Havana

blaisdell
PENCIL CO.
BETHAYRES, PENNA.

Marking Specialists to Industry and Office

For more facts Circle 443 on Reader Service Card ➤

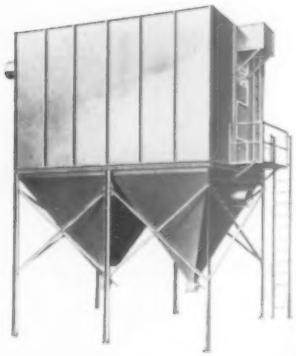


CHINA MARKERS BY blaisdell

These newly-improved markers now in two distinctive groups—BRITE *and* DEEP —for the sharpest contrast possible in marking all light and dark surfaces: china, glass, plastic, cellophane, metal, wood, et al. Designed with exclusive Spee-D-Point *for quick repointing* and Sted-D-Point *to hold leads securely.* See for yourself how Blaisdell China Markers mark everything better—brighter—sharper in 13 job-rated colors.

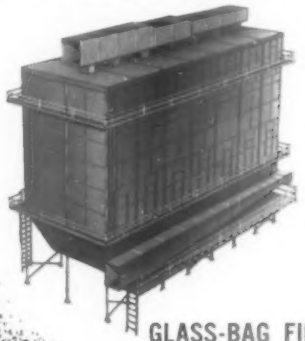
blaisdell PENCIL COMPANY • Bethayres, Pa.

▶freedom from almost any dust



MULTI-BAG FILTERS

▶freedom from hot, corrosive dust



GLASS-BAG FILTERS

THE NEW PLANT DIMENSION...

freedom from dust

▶freedom from dust thru cyclonic collection

WHIRL-CLONES

▶freedom from small or local dust problems

UNI-FILTERS

BAG-HOUSE COLLECTORS

Dracco can also design, engineer and fabricate bag-house type collectors, where know-how in the application of qualified components is essential.

Freedom from dust is a new plant dimension that measures administrative excellence as well as production efficiency.

Advanced manufacturing techniques, coupled with a nation-wide campaign against air pollution, have established need for a new high order of dust control. The Dracco collectors shown here, backed by 40 years experience in dust control engineering, can prove invaluable in your fight for clean plants and clear skies.

A new 28-page brochure "FREEDOM FROM DUST" includes full technical and application data on Dracco's complete line of dry collection equipment. Write Dracco Division of Fuller Co., Harvard Avenue and East 116th Street, Cleveland 5, Ohio.

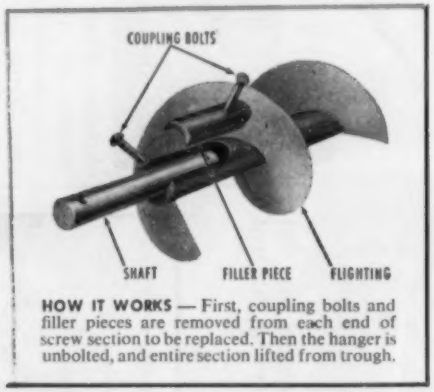
DRACCO *airstream* conveyors
dust control equipment

FULLER COMPANY GENERAL MANAGERS

For more facts circle 444 on Reader Service Card

How Quik-Link conveyor screws

KNOCK DOWN DOWNTIME



HOW IT WORKS — First, coupling bolts and filler pieces are removed from each end of screw section to be replaced. Then the hanger is unbolted, and entire section lifted from trough.

Only LINK-BELT Quik-Link lets you remove a single section without disturbing other components

Here's how you can side-step a serious production bottleneck. Quik-Link offers the fastest method yet of replacing a damaged screw and putting the conveyor back into service. Just a fraction of the normal time.

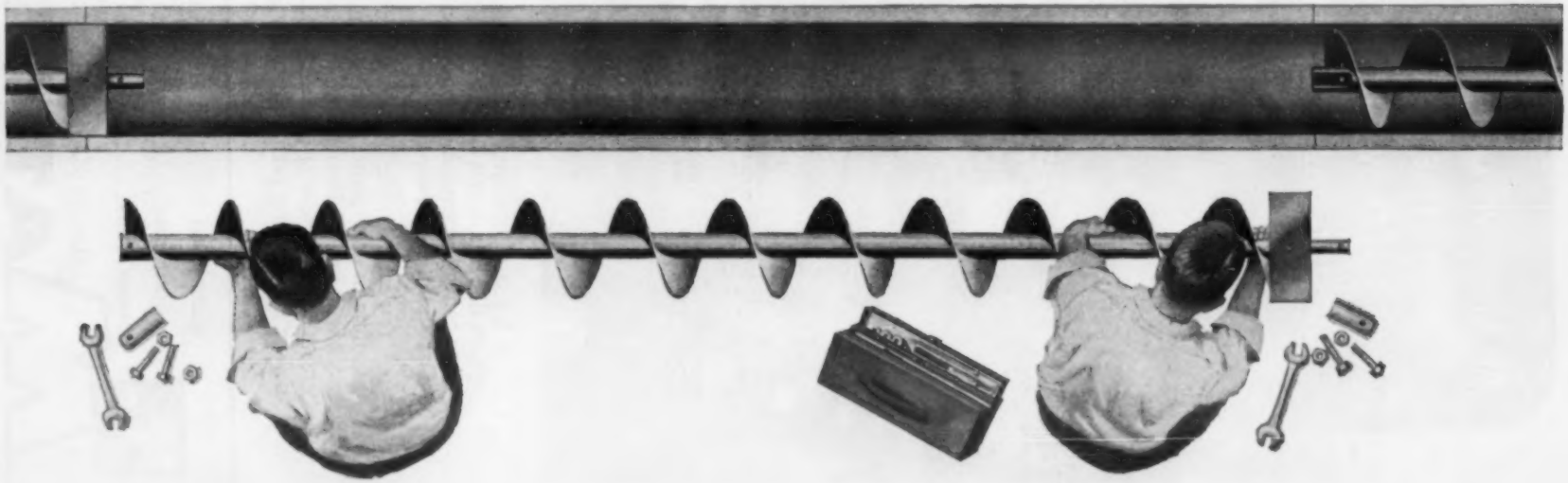
That's why it's time you investigated the "down-time insurance" built into every section of Link-Belt Quik-Link conveyor screws. Your maintenance men become quick-change artists in no time—a wrench and 30 minutes change the damaged screw section and put the conveyor back to work. What's more, there is no need to pull down the entire line . . . no need to disturb other conveyor components.

Quik-Link is just one of a whole group of Link-Belt screw conveyor components that are cutting maintenance and power requirements to the bone. For full facts call your nearest Link-Belt office or authorized stock-carrying distributor. Or write for Book 2989.

LINK-BELT

SCREW CONVEYORS 19.230

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.



All Mathews conveyer systems aren't this spectacular, but they all deliver outstanding performance

• It's true that everyone can't use an order-selecting system like this — but — it's also true that everyone specifying conveying equipment has a right to expect this type of *outstanding performance.*

You can have the benefit of well-planned mechanized handling in *your* plant. Mathews Engineers would like to work with you in developing a conveying system that will create a smooth flow of *your* product — a system that will deliver outstanding performance *for you.*

GENERAL OFFICES ..... MATHEWS CONVEYER COMPANY
Ellwood City, Pennsylvania
WESTERN DIVISION ..... MATHEWS CONVEYER COMPANY WEST COAST
San Carlos, California
CANADIAN DIVISION ..... MATHEWS CONVEYER COMPANY, LTD.
Port Hope, Ontario, Canada

Over Fifty Years of Leadership in Mechanized Handling

MATHEWS

For more facts Circle 446 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.

109—Pow-R-Off Attachment, for all machine tools using key-operated chucks, protects operator and machine during make ready. Locks switch in off-position while chuck key is in use. Saves operator's time. Key can't be misplaced. *H. B. Research & Development Co.*

110—Hand-Held Cycle Counter is placed near welder or cable to count a-c cycles of weld time to ±¼-cycle accuracy. Senses magnetic field around welding bus, transformer lead, or welding electrode. Battery-powered. Counts to 127 cycles. *Instrument Control Co.*

111—"Krane Kar" has boom that rotates full circle on massive ball-bearing turntable to permit efficient handling of bulky loads in box cars, trailers, etc. Open-view design affords unobstructed vision. In 6- and 10-ton capacities, 6½-ft. radius. *Silent Hoist & Crane Co.*

Turn the page

Announcing
Infrabeam
... the revolutionary photoelectric control using modulated infrared radiation

Model 9101

FOR THE FIRST TIME, photoelectric control is *simple, reliable,* and *practical* over an extremely wide range of applications.

Infrabeam is a totally new type of photoelectric control . . . developed and tested over a period of more than a year, now ready to go to work in your plant or as part of equipment you manufacture. It offers a combination of simplicity, sensitiveness and reliability that has never before been achieved.

New infrared detectors, perfected for missile guidance, are in many ways superior to photocells that respond to visible or ultraviolet light. In Infrabeam, the Receiver contains a similar infrared detector which is screened against visible light by a simple optical filter. Further, the infrared beam from the Projector is "modulated" — brightening and dimming at a frequency of 400 cycles per second. The Receiver is electronically tuned to this frequency, so that the control will not respond unless it gets a signal from the associated Projector.

WHAT THIS MEANS TO YOU ...

Compared with standard "general purpose" photoelectric controls, Infrabeam provides far greater sensitiveness in countless applications at close or moderate range. At extreme range — as much as 1000 feet — it offers superior reliability and freedom from interference. Because it operates equally well by reflecting the infrared beam from a detected object and into the Receiver, it is the *only* photoelectric control able to reach into "blind" areas with perfect freedom of installation.

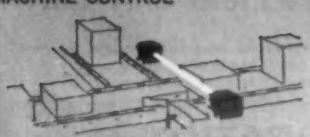
Projector and Receiver are attractively housed in anodized cast aluminum. The quick-detach hinge allows easy separation for use as opposed units, or accurate angling for use in reflection. Physical mounting and electrical connections are simplicity itself, and permit quick replacement of either unit without disturbing permanent wiring.

Find out how simple and practical photoelectric control can be for *you*. WRITE TODAY FOR COMPLETE DETAILS AND SPECIFICATIONS.

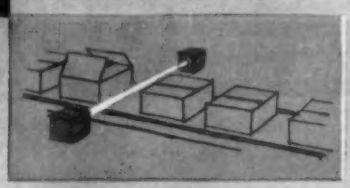
LONG-RANGE DETECTION

MACHINE CONTROL

LIQUID LEVEL CONTROL



INSPECTION OR SORTING



CONVEYOR CONTROL

ELECTRONICS DIVISION

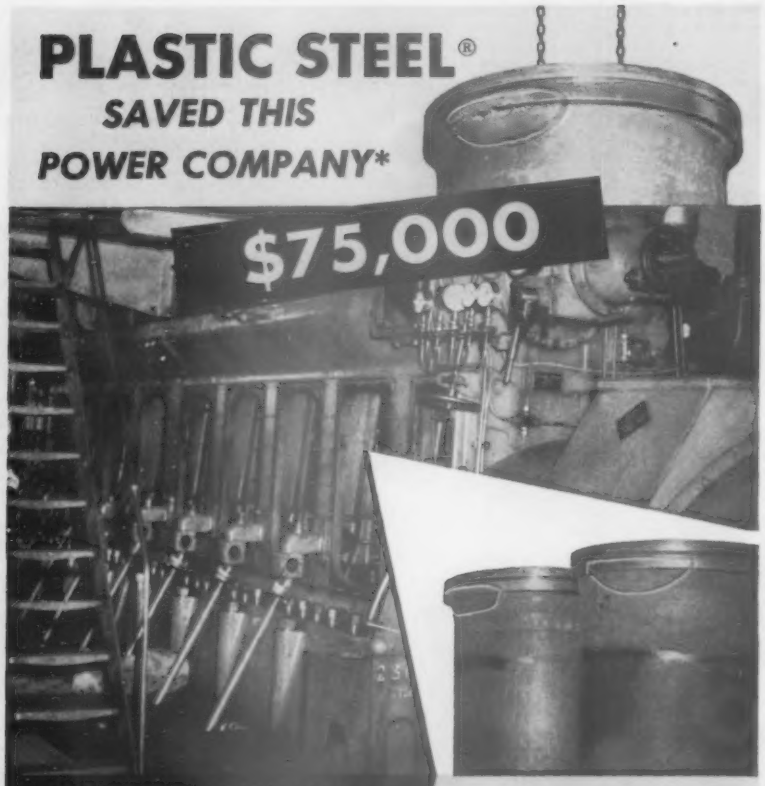
CRAMER CONTROLS

CORPORATION

CENTERBROOK, CONNECTICUT

For more facts Circle 447 on Reader Service Card

PLASTIC STEEL®
SAVED THIS POWER COMPANY* $75,000



THIS DIESEL GENERATOR unit was out of action because the wet sleeve cylinder liners and block were badly corroded.

PLASTIC STEEL® A
(Putty Type)
was applied to the corroded areas, allowed to harden for 2 hours and ground smooth. No heat or welding was required. All of the liners were reinstalled—and now, 2 years later, the unit is performing at peak efficiency. Cost of material—only $10!

**Bahamas Electricity Corp., Nassau, Bahamas*

The strongest, toughest, most versatile repair and tooling material available today!

Plastic Steel, THE ORIGINAL EPOXY REPAIR MATERIAL, and other Devcon products are used by steel mills, chemical plants and many other industries for repairing worn parts, salvaging cracked castings, sealing leaking hydraulic systems and tanks — building up worn pumps and valves — altering cams and gears — repairing fuel and water lines — even under pressure. Approved under Mil. Spec. MIL-C-15202. Bonds iron, steel, aluminum, brass, bronze, wood, ceramic, etc. to itself or each other.

Write today for free case histories of how Plastic Steel and other Devcon products have saved time and money on all kinds of plant maintenance jobs. Our laboratory and engineering staff is available to help with your special problems — no obligation, of course.

DEVCON CORPORATION
65 ENDICOTT STREET, DANVERS, MASS.

TRADE MARK

A COMPLETE LINE OF QUALITY PRODUCTS FOR PERMANENT REPAIRS AND PLASTIC TOOLING.

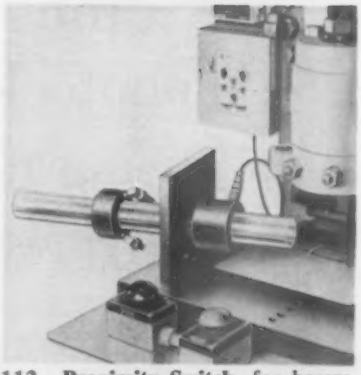
Order a supply from your local Industrial Distributor today.
Free catalog and engineering reports available on request.

***Plastic Steel is the registered trade mark for Devcon Corporation's metallic molding and filling compound.**

FACTORY/EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

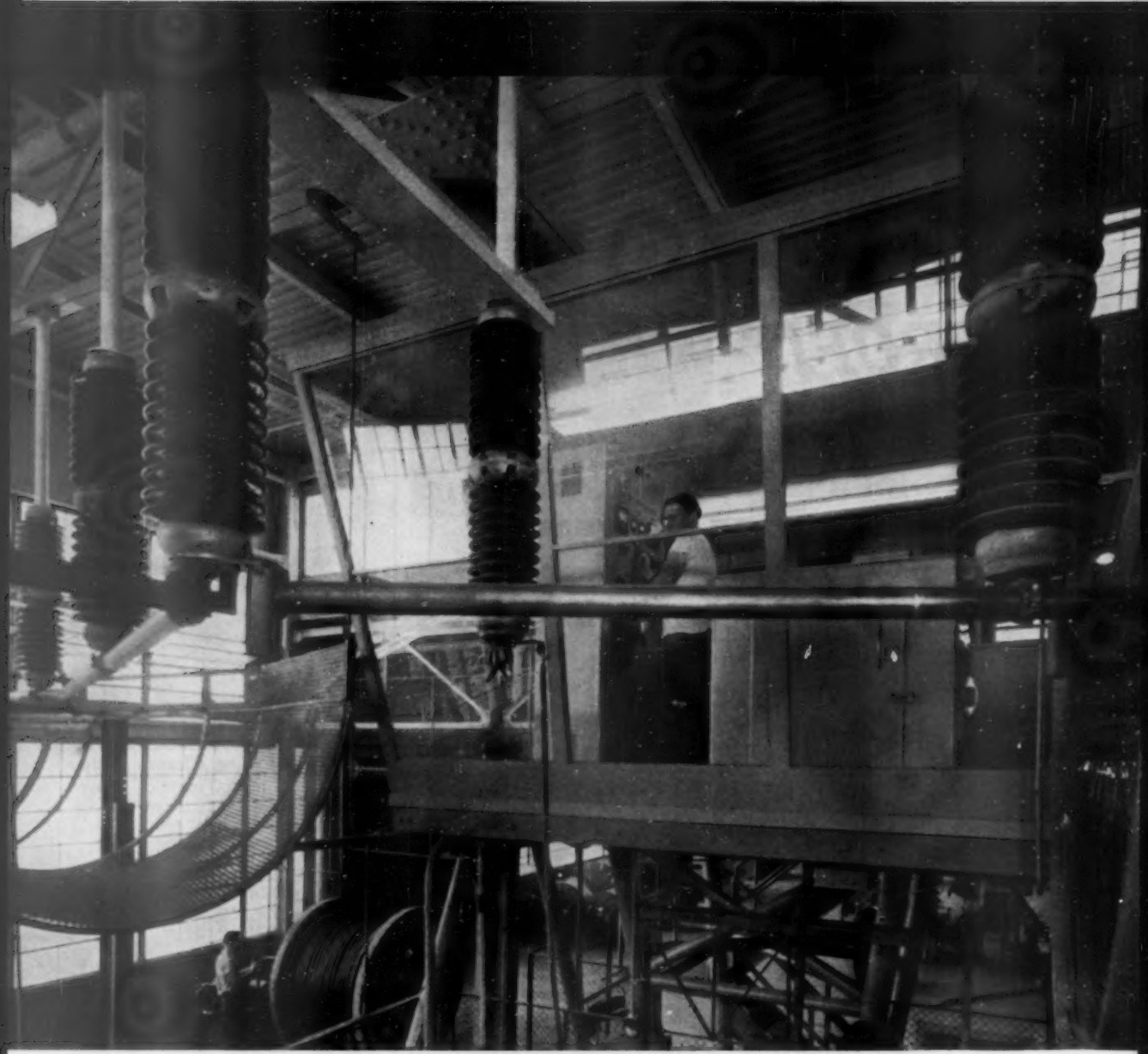


112—Proximity Switch, for heavy-duty presses, instantly detects malfunction and automatically stops equipment to prevent damage. Sensitive to ferrous or non-ferrous metal parts. Features fail-safe high-frequency oscillator and electronic timing circuit. *Robotron Corp.*

113—Pendant-Type Enclosure, for pushbutton controls, is made of rubber to resist penetration by oil, moisture, grease, most chemicals. Shock - absorbent, vibration - free. Bright yellow, it's good for boring mills, trucking and loading, crane operations. *Daniel Woodhead Co.*

114—Airless Spray Gun permits continuous recirculation of liquid to maintain desired viscosity where paints, etc., must be kept at high temperatures. Spray head outlet can be easily cleaned. Trigger controls. Uses air line to 2000 psi. *Spraying Systems Co.*

Turn the page



Shown here is a section of final testing area. Voltage tests are being applied to *full reel lengths* of cable before shipment.

ANOTHER BIG REASON WHY YOU SHOULD CONSIDER ANACONDA BUTYL (AB) CABLE—

SPECIALIZED QUALITY CONTROL AND INSPECTION

From the start: Raw-material suppliers are required to submit certified test reports. Then, tests and sampling at our plant offer extra protection even before production begins. **To finish:** Here's the final inspection line where the finishing touches are applied and where every inch of cable is carefully inspected. Perhaps you already know that Anaconda test procedures are much above industry standards. But do you know that test voltages on Anaconda Butyl (AB) Cable are 125% of industry standards—that minimum corona level is 150% of rated voltage to ground?

Quality control at Anaconda is *more* than mere testing and inspection. It is built into every manufacturing step. That's why you can be sure your Anaconda cable will be of high quality—why you can be sure Anaconda Butyl (AB) Cable is the finest rubber-insulated cable you can buy.

Everything you need to know about Anaconda Butyl (AB) high-voltage cable is neatly summed up in a new booklet, DM-5903, "Anaconda High-Voltage Durasheath* Cable." For your copy, write to: Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y. *Reg. U.S. Pat. Off.

ASK THE MAN FROM

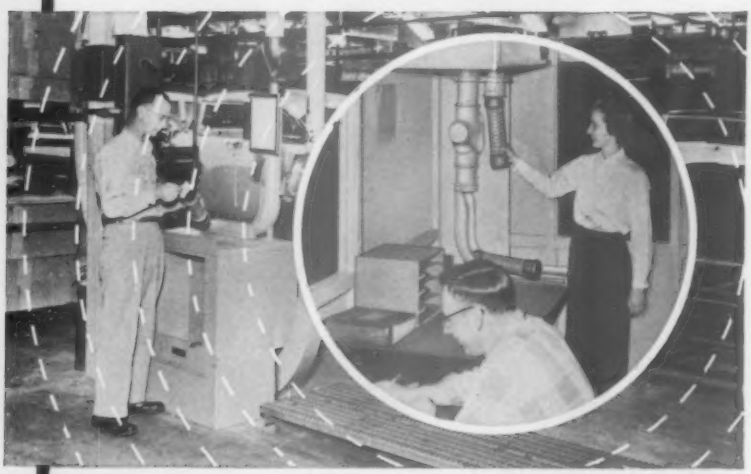
ANACONDA®

ABOUT BUTYL (AB) HIGH-VOLTAGE CABLE

For more facts Circle 449 on Reader Service Card

MECHANIZE... PROFIT-WISE!

...with a LAMSON AUTOMATIC AIRTUBE SYSTEM



Now, all departments are but seconds apart and fully informed

If time means money to you – why spend it on paper?
Stop for a moment. Try to estimate how much it costs to send one message from your department to another.

Multiply the costs

Now, envision a system whereby you place your message in a handy carrier, dial its destination, place it in a nearby LAMSON AUTOMATIC AIRTUBE and sit back confident that your message is flying through the air directly to its destination, arriving in a matter of seconds.

Multiply the service

Why not consult a LAMSON Field Engineer. He specializes in inner-communications systems that keep *orders, invoices, records, punch cards, blueprints, small tools, samples, inter-office memos, mail* . . . flying a controlled inner-air route at 25 feet per second, 24 hours a day – AUTOMATICALLY.

Multiply the savings

They will amortize the entire cost of the installation. Simply clip this advertisement to your letterhead for full information about Automatic Airtube Systems and mail to:

LAMSON

PIONEERS *the Conquest* OF INNER SPACE

LAMSON CORPORATION
403 Lamson Street, Syracuse 1, New York

PLANTS IN SYRACUSE AND SAN FRANCISCO • OFFICES IN ALL PRINCIPAL CITIES

Manufacturers of Airtube® (Pneumatic Tube Systems) • Integrated Conveying Systems • Pallet Loaders • Selective Vertical Conveyors • Bookveyors® Clinical • Trayveyors® • Food Service Systems • Blowers and Exhausters • Exidust® Central Vacuum Cleaning Systems • Dryset® Air Vacuum Systems

134 For more facts Circle 450 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.

115—Wall-Ceiling Cleaner washes 100 sq. ft. in six minutes. Saves time, reduces maintenance cost. Uses no electricity. It's noiseless and dripless. Leaves no streaks, splotches. Dual tanks feed special cleaning solution to two lightweight trowels. *Alan Mfg. Co.*

116—Load Controller measures real motor load in kilowatts. For single- or three-phase, 110- to 440-v. motors. When preset overload is reached, device actuates audible or visible alarm or shuts down machine to prevent damage. Costs under $200. *Seneca Falls Machine Co.*

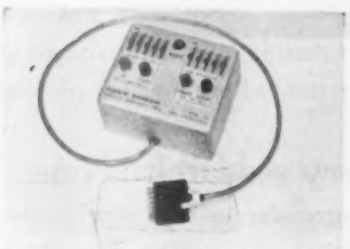
117—Carton Unstacker uses air (to 50 cu. ft./min.) instead of hydraulic cylinders to hoist, clamp, move pallets. Handles 40 to 45 cartons per min. Air cushions impact—less wear on machine and cases; it's cleaner—no dust-collecting oil film. *Standard Conveyor Co.*

For more about these items, circle numbers on Reader Service Card next to back cover.

118—Belt Pulley, wing-type, has rubber lagging (bars) that grips belt tightly to spall off dried material on underside. Eliminates pulley-cleaning shutdowns at head and tail position of conveying systems. Ideal for automated systems. *Van Gorp Mfg., Inc.*

119—Reed Vibrometer accurately indicates frequency and amplitude of vibrations to detect malfunctions, measure machine rotation, locate unwanted noise. Output attaches to oscilloscope or graph to make permanent record. Hand-held; 120 to 15,000 cpm. *Korfund Co.*

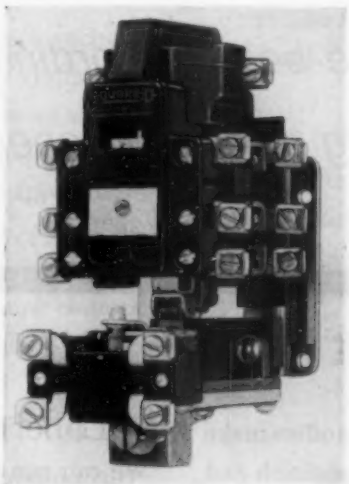
120—A-C Welder, measuring only 24x30x28 in., achieves low height by placing transformer on side and coils laterally instead of vertically. "Low-Boy" design permits stacking three units; uses no added floor space. In 300-, 400-, 500-amp. models. *A. C. Smith Corp.*



121—Data Recorder is fed accounting and production control information at remote work station. Data are recorded on punched cards, reducing paperwork, labor. These small, low-cost recorders can be connected by common cable to central key punch. *Digital Sensors.*

122—Coolant Filter cleans sludge, etc., from 200 to 2500 gpm. of water soluble oil coolants. Eliminates downtime by recirculating liquid continuously for grinding and machining. Works without use of solenoids, air cylinders, control valves, and the like. *U. S. Hoffman Machinery Corp.*

123—Trolley Hoists have capacities to 2 tons in electrical, to 12 tons in manual models. Link chain on electrical model flexes in any plane for more flexible application. Lightweight manual type cuts headroom between I-beam and hoist up to 50%. *Yale & Towne Mfg. Co.*

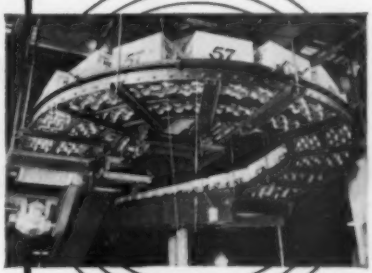


124—Combination Relay - Timer has same mounting dimensions as individual timers and relays. Cuts installation time and mounting space. Relay rated at 10 amp.; timing range, 0.2 sec. to 1 min. Timer provides delay after energizing or de-energizing. *Square D Co.*

Turn to page 138

MECHANIZE... PROFIT-WISE!

WITH LAMSON ENGINEERED CONVEYOR SYSTEMS



Engineers Break A Bottleneck

It's True.

Mechanization will increase the capacity of your present buildings and the production of your present equipment. Increased profits will amortize the expense.

But, you need the touch of experienced materials handling engineers to guarantee this result. That is where LAMSON leads all the rest.

During the past 75 years, LAMSON engineers have created more custom engineered conveyor systems that have cut costs, raised production and profits than any other firm. For complete, professional service from problem analysis through installation and beyond, you can depend on LAMSON.

Write LAMSON today for a complete conveyor catalog. It may provide the answer to your materials handling problem. Or, simply clip this advertisement to your letterhead and mail to:

LAMSON

LAMSON CORPORATION

403 Lamson Street, Syracuse 1, N. Y.

PLANTS IN SYRACUSE AND SAN FRANCISCO
OFFICES IN ALL PRINCIPAL CITIES

Circle 451 on Reader Service Card

Testing, and tech

. . . the "plus value" of DeVilbiss total service makes the difference between ordinary and outstanding finishing or coating operations

The extra services DeVilbiss offers make the difference between a merely good finish and a superior finish on your product . . . between a hodgepodge of equipment and a practical, smooth-working setup . . . between an adequate finishing method and the scientifically correct method . . . between average operators and trained craftsmen.

Laboratory research is one.

We can run comparison tests on your product or component using your coating formulation with all the latest equipment, both automatic and manual. You receive a complete report—including the actual production rates, material consumption, labor savings, and coating properties, plus the proper combination of equip-

training, nical help

ment for each method tested. It's scientific. It's accurate. There's no obligation.

Operator training is another.

The DeVilbiss tuition-free spray-painting school in Toledo offers intensive one-week courses to make your operators or supervisors more skilled in the use of the precision coating and finishing equipment you invest in. It includes application instruction, equipment maintenance, as well as procedures for adapting existing equipment to new requirements. On request, training courses can often be arranged in your plant.

And field services.

DeVilbiss branch office engineers are especially trained to aid you in planning, selecting, and installing washing, coating, and drying equipment. In addition, DeVilbiss factory branches keep a full line of spray equipment and accessories, hose, paint pumps, and air compressors in stock for "off-the-shelf" buying convenience. Rebuilt Exchange on guns and compressors, and authorized factory service on all equipment items are maintained from coast to coast. More than 150 strategically located distributors and jobbers also stock and sell DeVilbiss parts and equipment.

This is total service from DeVilbiss. Put it to work for you and see the rewarding difference in *your* coating or finishing operations. The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ontario; London, England; São Paulo, Brazil. Branch offices in principal cities.

FOR TOTAL SERVICE, CALL
DEVILBISS

BELMONT

Ajax Spiralwound
FLANGE and BOILER GASKETS

No waiting for the popular types and sizes of spiralwound flange and boiler gaskets. Belmont backs their Distributors in 132 key industrial areas with stocks on hand for immediate shipment.

TYPE SR with steel centering ring for raised face, Van stone and lapped joints. All nominal pipe sizes from ½″ through 24″ in pressure ranges from 150 psi through 600 psi; and from ½″ through 12″ in pressure ranges to 2500 psi.

TYPE H with loop centering guide for raised face, Van stone and lapped joints. All nominal pipe sizes from ½″ through 24″ in pressure ranges from 150 psi through 600 psi (except 400 and 600 psi gaskets above 8″, for which services Type SR Gaskets are stocked).

TYPE MH and CR Boiler manhole gaskets in 3 pressure ranges—to 499 psi, to 999 psi and 1000 psi and above. Sizes 11″ x 15″ and 12″ x 16″ in flange widths from ¾″ to 15/16″.

TYPE A for boiler handholes and tube caps in 3 pressure ranges—to 499 psi, to 999 psi and 1000 psi and above. Most popular sizes for Babcock & Wilcox, Combustion Eng., Edgemoor, Erie City, Foster Wheeler, Heine, Keeler, Union and Vogt boilers.

Ask your nearest Belmont Distributor for a complete stock list. You will find him in our insert in the Packing Section of Conover-Mast Purchasing Directory.

BELMONT

The Belmont Packing & Rubber Company • Butler & Sepviva Sts., Phila. 37, Pa.

FACTORY/EQUIPMENT NEWS

Begins on page 122

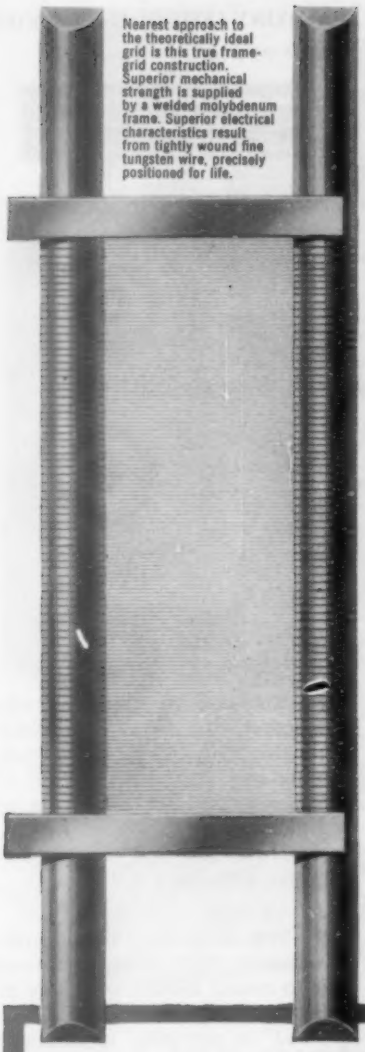
For more about these items, circle item numbers on Reader Service Card next to back cover.

125—Transistorized Cleaner ultrasonically removes soils and contaminants from precision parts, electronic components, small subassemblies, etc. Rugged, compact, its generator output is 40 watts. Easy to operate, needs little maintenance. *Branson Ultrasonic Corp.*

126—Pi Tape measures inside or outside diameters directly to 0.001 accuracy by means of special graduations and vernier. Also good for sheet metal and solid parts. Eliminates expensive micrometers. Tape, 12 in. long, measures parts from 2 in. in dia. *Pi Tape.*

127—Power Sweeper uses an 18-hp. motor to operate sealed hydraulic drive system that transmits power to rear wheels. Pedal controls forward, reverse, speed changes, brakes. Needs no brake maintenance or sweeper adjustments. *Hydra-Action Co.*

Turn the page



Nearest approach to the theoretically ideal grid is this true frame-grid construction. Superior mechanical strength is supplied by a welded molybdenum frame. Superior electrical characteristics result from tightly wound fine tungsten wire, precisely positioned for life.

Advantages of true FRAME GRID construction . . .

- Frame-grid construction
- High transconductance
- High input impedance
- Low noise figure
- Cooler-operating grids
- Trouble-free coiled heater
- Dependable, long life
- Uniform characteristics

High-gain
Twin Triode

Now available in CBS ECC88/6DJ8 TWIN TRIODE

For a new high in reliability, replace with the CBS ECC88/6DJ8. Get the advantages of its true frame-grid construction and superior performance in industrial applications . . . where dependability really counts.

Try replacing the 6BQ7A, wherever possible, with its more reliable counterpart . . . the CBS ECC88/6DJ8. Order today from the listed Manufacturers Warehousing Distributor nearest you.

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A Division of Columbia Broadcasting System, Inc.

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Minutes from Your New Plant in Tidewater Virginia

Industry really *lives* in Tidewater Virginia where unlimited recreational opportunities are available to all — executives and production employees.

Within minutes of plant or home, Tidewater has the outdoor facilities and activities which assure the stability and morale of plant personnel. And living costs are low comparatively . . . housing is plentiful with excellent selection . . . all of this in a warm climate among friendly people.

There are other important considerations for industry in Tidewater. Unequaled Hampton Roads deep water terminals . . . transportation and trunkline railroads . . . abundant labor, fuel, power . . . all within immediate access to leading consumer and industrial markets. An expanding, confident business climate assures company prosperity.

For a confidential report, obligation-and cost-free, researched to your company's exacting specifications, please contact:

Clarence H. Osthagen
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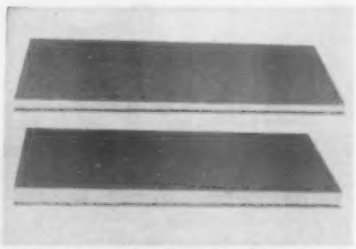
FACTORY/EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

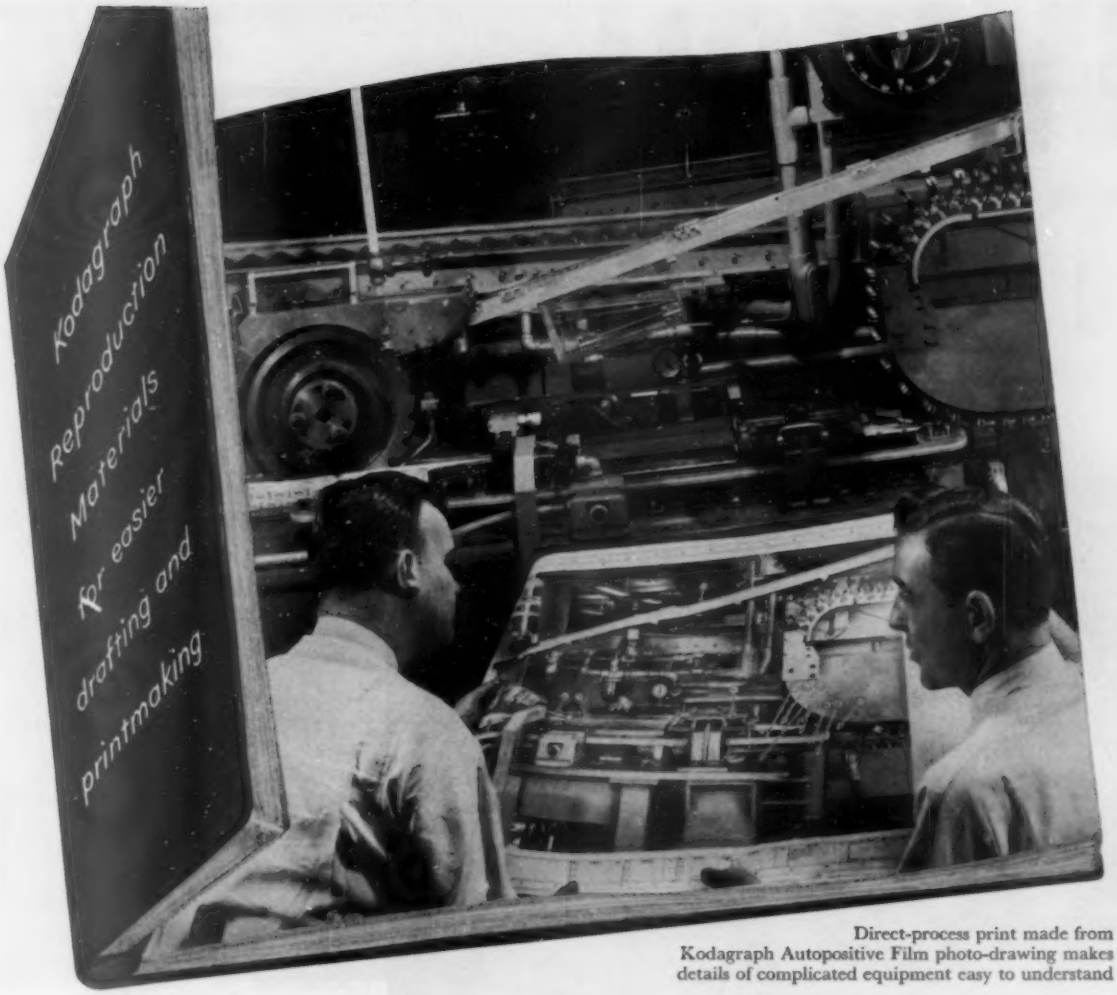
128—Rate-of-Feed Indicator tells production supervisor if machine is running at full capacity. Direct-reading dial gives rate of feed of machine tools using pneumatic or hydraulic actuators. Permits maximum production and reduces tool damage. *Digitool Corp.*

129—Wire Mesh Cord Grip distributes bending over several inches of pipe to reduce failures from side or longitudinal tugs or stresses. "Arch of bend" is controlled to eliminate sharp bends and subsequent ruptures. For cables from ¼ to $1\frac{13}{16}$ in. OD. *Ralco Mfg. Co.*



130—Acoustic Panels, for use as sound barriers and as partial enclosures, control noises in plants and offices. May also be used to construct control rooms, machinery enclosures. In cold-rolled, galvanized, or stainless steel. *Industrial Acoustics Co.*

Turn the page



Direct-process print made from Kodagraph Autopositive Film photo-drawing makes details of complicated equipment easy to understand

One picture better than 1,000 lines

Low-cost photo-drawings save countless hours of redrafting, improve communications, speed construction

"Let's take some pictures"—that's the first step today in many drafting rooms *when* additions or revisions are called for in existing equipment; *when* equipment layout drawings must be made from engineering models; *when* assembly, wiring, or piping plans for machines or products must be created from a prototype.

After pictures are taken on these jobs—and countless others—it's an easy operation for your printroom or local blueprinter to make positive intermediates which combine desired negatives and your drawing forms.

Every detail on these prints is accurate, up-to-the-minute, and in desired perspective—easy for anyone to visualize. Just add dimensions, connecting lines or other new detail and your photo-drawing is ready.

Free booklet gives interesting details on photo-drawing techniques and the savings they make possible. Send for your copy today!

Graphic Reproduction Division, Eastman Kodak Company, Rochester 4, N. Y.

Kodagraph Reproduction Materials

For better line-for-line reproduction

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WATCH THIS

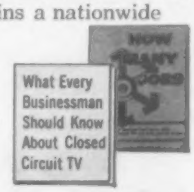
Inside Open Hearth Furnace At Steel Mill

On GPL Closed Circuit TV

- **Training • Production Control • Surveillance**
- **Property Protection • Material Handling**
- **Dangerous Viewing • Traffic Control • Work Coordination**
- **Process Control • Centralized Record Viewing**

GPL, first in closed circuit TV sales, can provide a reliable, high-quality system for you at surprisingly low cost. GPL maintains a nationwide sales and service network for your convenience.

To learn why more and more of the nation's industrial leaders are turning to GPL Closed Circuit TV, write for FREE brochures, "How Many Jobs" and "What Every Businessman Should Know About Closed Circuit TV."



GPL DIVISION
GENERAL PRECISION, INC.
PLEASANTVILLE, NEW YORK

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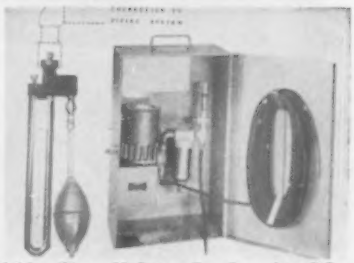


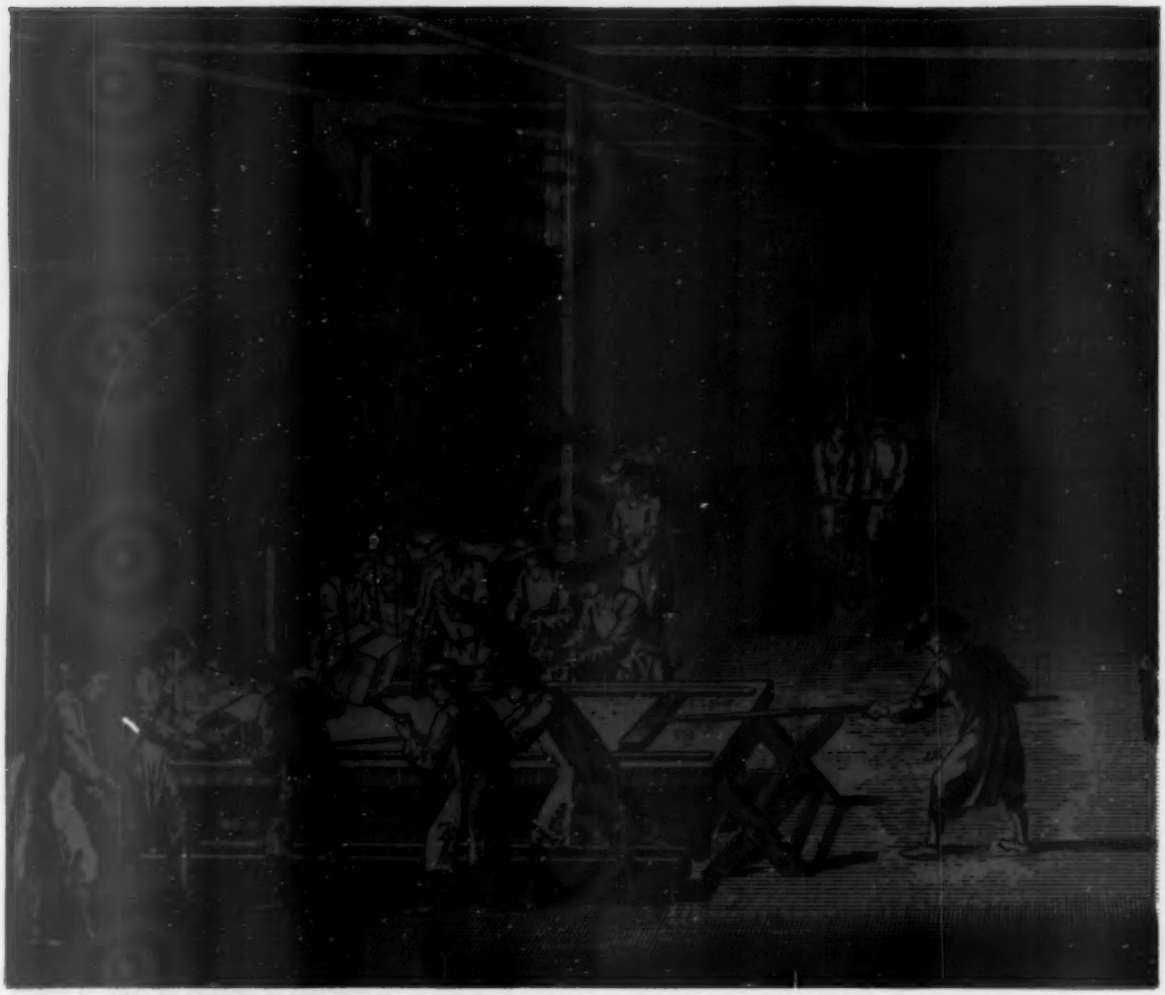
131—De - Tekta - Leak simplifies checking for leaks in gas piping and refrigeration systems, etc. Manometer connects to system; rubber bulb or small power-driven pump builds up pressure. Manometer shows pressure; any loss means a leak. *Eclipse Fuel Engineering Co.*

132—Gas Turbine, with NEMA rating of 9000 bhp., provides low-cost source of rotative power for centrifugal compressors, power generators, liquid pumps. Single-shaft unit burns liquid, gas fuels. Operates under full load at 5000-rpm. speed. *Clark Bros. Co.*

133—Aluminum Louvers have interchangeable parts to permit replacement of damaged sections without destroying complete unit. Made of heavy-duty 0.063-in. sheet, louvers are held together with only 8 aluminum screws. In sizes up to 12x5 ft. *Walcon Corp.*

134—Air Scrubber removes contaminated fumes, complex nitrogen oxides, hot oils, alcohol, fine dust, etc. Air entering from bottom is filtered through two flooded reaction beds. Water from top keeps beds flooded. Two types: 25-2000 and 250-5000 cfm. *John Wood Co.*

Turn the page

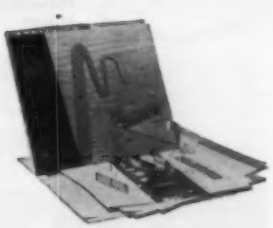


To Production Managers and Plant Engineers interested in increased efficiency and economy.

This 18th century glass manufacturer's dependence on men's muscles for materials handling is a far cry from today's methods. In modern plants skilled engineers have specified and now rely on Chainveyor overhead conveyor systems to reduce handling costs and speed production. Adaptable to an infinite variety of needs, Chainveyor has proven to be the answer to more profitable operation.

Chainveyor's amazing versatility lends itself to modernization of existing plant facilities as well as to new plant construction. Use of prefabricated standard parts permits easy installation, as well as fast and economical alteration when your handling needs change.

Power and free or straight power systems are specifically engineered for your needs. Chainveyor's "go anywhere" flexibility can provide fast, slow, or stop-and-go movement of loads. Many of today's critical production requirements are solved more efficiently and economically with Chainveyor.



Circle your Reader Service Card for quick, practical answers to your materials handling questions, and get Chainveyor's special Planning Folder which includes Illustrated Catalogs, Explanatory Diagrams, and Plant and Conveyor Planning Grids for preliminary layouts.

QUALITY OVERHEAD CONVEYOR SYSTEMS

CHAINVEYOR® CORPORATION

Engineers & Manufacturers

Distributors in all principal cities. District offices: Chicago, Detroit, Jacksonville, Newark, New Orleans. **Main offices, 5618 E. Washington Blvd., Los Angeles**

NEW! UNISORB "UL" Machine Mount ...for machines with built-in leveling screws

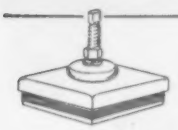
The new model "UL" Unisorb Level-Rite Mount has been developed specially for use under machines with their own leveling screws.

It combines a Unisorb vibration control pad with a cast steel base plate having a recessed center to accept the leveling screw. The Unisorb Level-Rite "UL" eliminates all need for anchor bolts or lag screws, and machines can be moved whenever needed. The Unisorb Pad reduces transmitted vibration up to 85%, allows higher machine speeds, cuts noise and lowers building maintenance.

Unisorb Level-Rite "UL" is available in a range of sizes and loadings, and with high or super density Unisorb — to meet all requirements. Ask about this mount — or any one of the other Unisorb Mounts — from your local distributor or write direct.

Unisorb Mounting Pads
Unisorb pads are the basic vibration control unit, identified by the red centers and brand mark. Available in a wide range of densities and thicknesses for proper application. Saves up to 80% in installation time and costs.

Unisorb Level-Rite 200
Unisorb Level-Rite "Junior" has been especially designed for light machines, air conditioners, business machines and similar equipment. A low cost, precision leveling device and vibration control unit, with loading limit of 200 lbs. per unit. Ideal for original equipment.



Unisorb Level-Rite Mount
Unisorb Level-Rite is a universal, self-contained leveling device for all types of machines. Fast, simplified way to achieve and hold precise level. Available with exclusive screw-post design or as a basic mounting plate for use with built-in leveling devices.

Remember — to simplify installation, improve performance and control vibration . . .

UNISORB MOUNTS MAKE THE DIFFERENCE

. . . for all types of machines from laboratory equipment to giant presses.
Ask for a **Money-Back Trial . . . Now!**

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FACTORY/EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

135—Hand Bender shapes tubing or ⅜-in. solid steel rod in few seconds with little effort. Permits bends to 270 deg. Tooling for square, vee, or round shapes comes with bender; odd shape tooling made to order. Takes minutes to set up. *Vemaline Products Co.*

136—Gas Burner achieves uniform temperature for heat treating, regardless of uneven loading. Lowers gas intake while maintaining excess air rate. Flame monitor insures safety. In pipe sizes to 1½ in., with 150:1 heat turndown ratio. *North American Mfg. Co.*

137—Hydraulic Pump Motor, with unique mounting bracket, eliminates mounting base, complicated adapters. Corrosion-resistant cast-iron frame gives extra support to pump and motor. In single- or double-end models, ratings from ¾ to 50 hp. *U. S. Electrical Motors Inc.*

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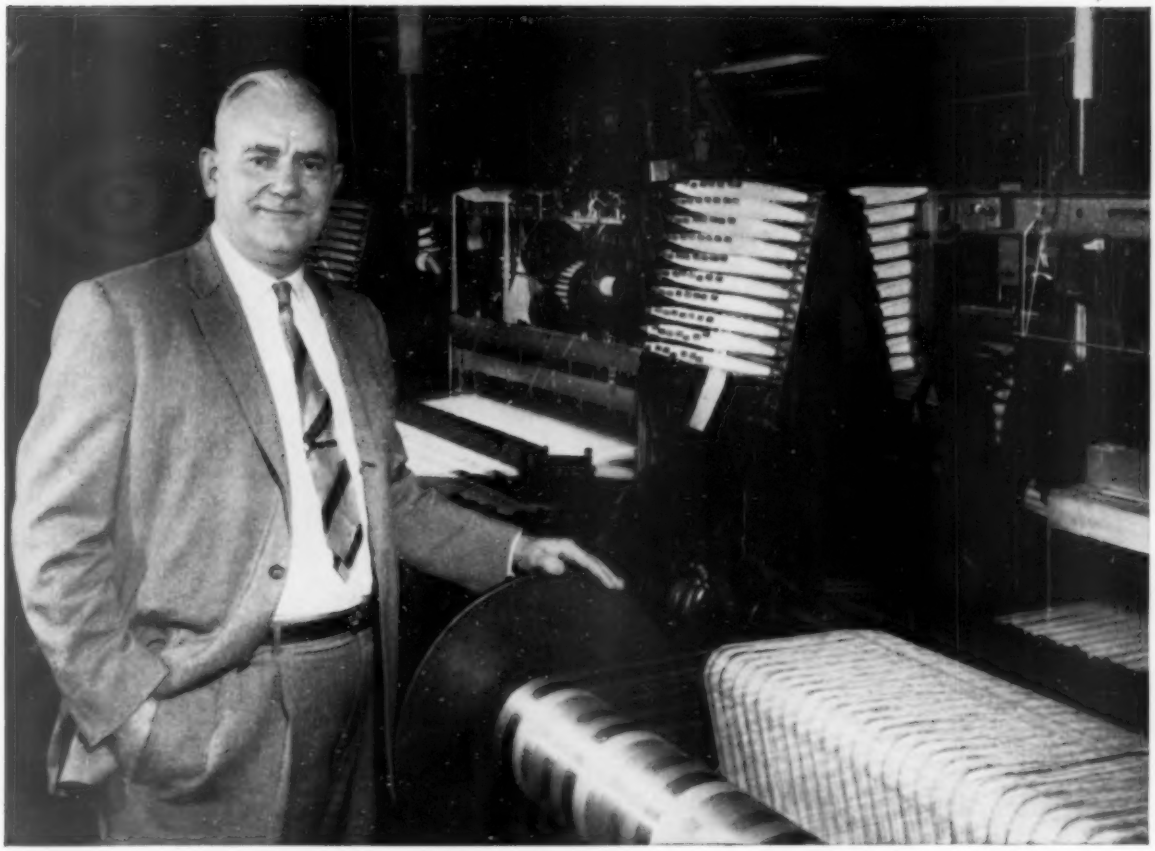

Mr. Walter E. Baur, Plant Superintendent of the Bloomsburg Mills in Lock Haven, Pennsylvania, says:

"Our Honeywell air cleaning system helped us cut rejects more than 30 per cent"

Fabrics stay much cleaner at Bloomsburg Mills because Honeywell air cleaning removes 90 per cent of airborne dirt.

"We recommend Honeywell electronic air cleaning without reservation," says Mr. Baur. "Airborne dirt is ordinarily a very serious problem; but in our plant, even overhead fixtures, piping, etc. are free from dust and lint. Woven goods, particularly the loom-finished whites are much cleaner. Rejects have been reduced more than 30 per cent!"

Honeywell installed a high capacity electronic air cleaner in Bloomsburg Mills' ventilating system. As a result, the plant's water-spray tank, which had to be cleaned weekly, is now free of dirt sediment. Ninety per cent of airborne dirt is stopped by the air cleaning system!

According to Baur, employees enjoy new vitality and are more productive in this fresh, clean environment.

Your plant also will benefit from Honeywell electronic air cleaning. Honeywell will gladly work with your architect and engineers from the planning to the operational stage. Contact any one of 112 local Honeywell offices. Or write Honeywell, Dept. FM-4-70, Minneapolis 8, Minnesota.

Plant Engineer Jim Andrus at Honeywell Control Cubicle where he directs the entire air cleaning operation.

Honeywell

First in Control

SINCE 1885

75th YEAR PIONEERING THE FUTURE

Yale low-cost electrics

in the 2000-3000-lb. capacity range are saving time and money for industry every day. Delicate maneuvering and deft handling are especially easy with this truck, for the mechanically actuated carbon pile speed control permits close-in inching and infinite speed variation. Twin-caster steer wheels make steering effortless, and easy right-angle turns in narrow aisles sharply increase storage space, cut stacking time. This electric truck saves maintenance overhead and "down-time" because of a minimum of moving parts and an economical powerplant. This is one of Yale's complete line of industrial lift trucks ... the right truck for every job!

For full information, call your Yale representative or send for free brochure #5265 to The Yale & Towne Manufacturing Co., Materials Handling Div., Philadelphia 15, Pa., Dept. KT7.

Yale Materials Handling Division, a Division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark. Products: Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks Worksavers · Warehousers · Hand Trucks · Industrial Tractor Shovels Hand, Air and Electric Hoists.

YALE®

INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS · HOISTS

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In this fixture "torture chamber" water and steam are constantly present . . . yet trouble-free lighting is provided by Sylvania's DIRON fixtures.

now... *True All-Porcelain Fixtures for Extreme Humidity Conditions*

Sylvania's New DIRON Fixtures

Here is a new, important advancement in fluorescent lighting fixtures . . . especially for textile mills, laundries, tanneries and other high humidity locations.

Selected Sylvania fixtures—both industrial and open-type—now have the new DIRON finish, a super-thin, all-porcelain process.

Every external part of these fixtures—*even the lamp-holder cases* for multi-lamp units—is protected against moisture by this exclusive DIRON process.

By this new method a tough, durable layer of porcelain is applied to *all* exposed surfaces of the fixtures. Yet the finish is so strong and pliable that knockouts can be removed without damaging the porcelain protection.

You'll find these fixtures both practical *and* economical. The new DIRON fixtures cost much less than conventional all-porcelain units. And the price is so close to that of standard industrial fixtures that you'll want to use DIRON units when there is any chance of a high humidity or corrosive atmosphere.

For full information on Sylvania DIRON fixtures, write to:

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
One 48th Street, Wheeling, West Virginia

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FLUORESCENT LIGHTING FIXTURES AND SYSTEMS • BEST FIXTURE VALUE IN EVERY PRICE RANGE

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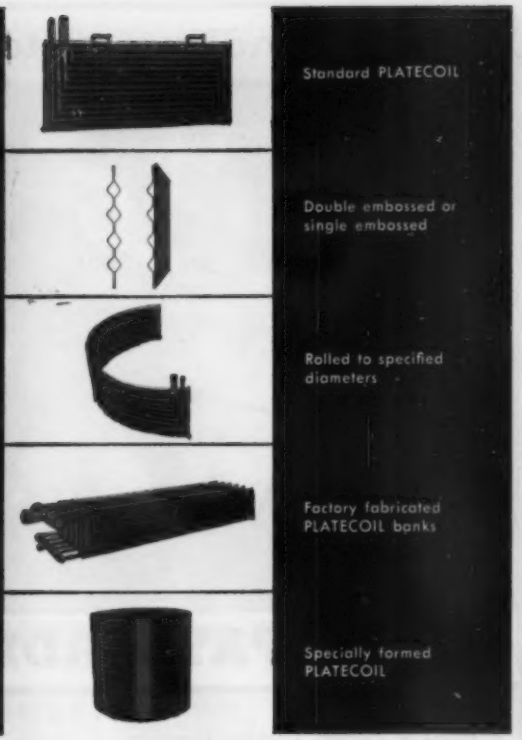
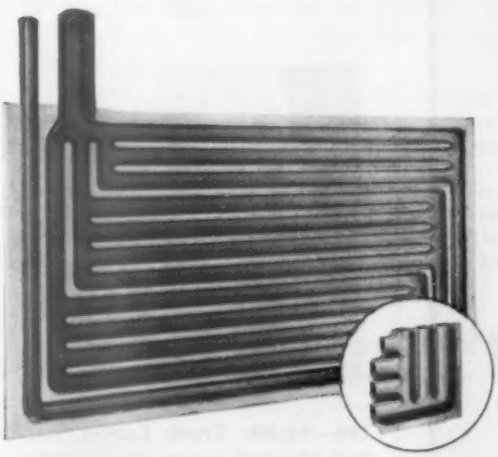
SOLVES TOUGH HEAT TRANSFER PROBLEMS

for heating and cooling



Now you can apply the advantages of PLATECOIL to a wider variety of tank and process heating and cooling problems than ever before. In addition to a broad range of standard sizes, styles and metals, specially fabricated PLATECOIL is cutting cost and increasing efficiency in many applications which require unique performance, installation or maintenance characteristics. PLATECOIL Engineers will be happy to discuss specific heat transfer problems with you.

NEW MULTI-ZONE* PRINCIPLE PRODUCES MORE EFFECTIVE HEAT TRANSFER



NEW MULTI-ZONE, header-type PLATECOIL design increases performance and savings on fabrication, installation, tank space start-up time, and operating costs. Multiple headers and condensate returns improve steam distribution, eliminate condensate "blocking" and produce more effective heat transfer area. All stainless steel and alloy PLATECOIL units affected by cold working are annealed and pickled after fabrication to return the metal to its original condition and thus eliminate the probability of corrosion due to internal stresses and carbide precipitation.

FASTER "START-UP" In tank and process application where week-end or other periodic shut downs are encountered, the faster heat up with the new MULTI-ZONE PLATECOIL represents real production increases. Temperature drops due to introduction of new work into processing tanks are quickly overcome through MULTI-ZONE reserve capacity.

OPERATING PRESSURES UP TO 250 PSI The new PLATECOIL is rated up to 250 psi. This opens up many new application possibilities. Now you can apply the inherent advantages of light weight, compactness, easy maintenance and greater efficiency to tough high pressure heating and cooling problems.

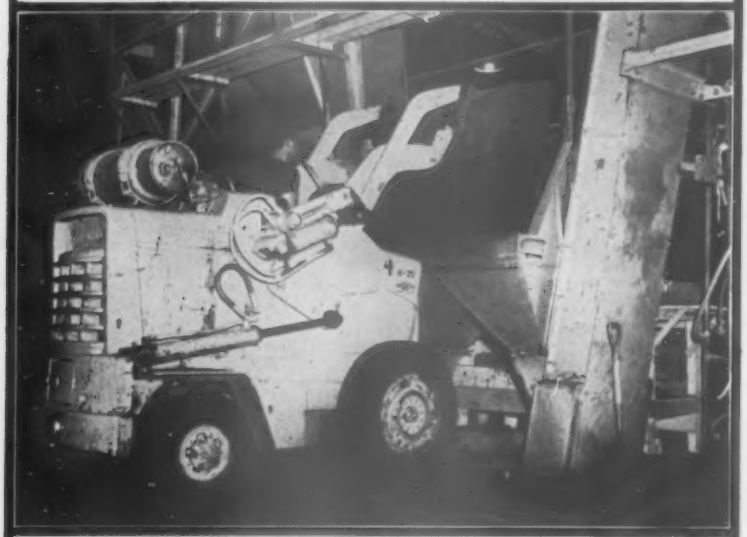
*Patented
Send for Bulletin P60 for more data.

Tranter Manufacturing, Inc.
LANSING 9, MICHIGAN

PLATECOIL® DIVISION

For more facts Circle 464 on Reader Service Card

Plant handling system built



around 3 PAYLOADER® units

Davis & Furber Machine Company of North Andover, Mass., specializes in manufacturing textile machinery. Since 1952 this company has been a continuous user of "PAYLOADER" tractor-shovels on its foundry floor. Two Model HA's (2,000-lb. operating capacity) handle sand, move materials, remove cupola waste and the like. Recently the firm added Hough's new H-25 (shown) to its "PAYLOADER" fleet. This unit is used principally during the molding operation, bringing sand from storage to supply a 4-station sand system. At night it returns the sand from the muller to storage.

You will find that an H-25 "PAYLOADER" tractor-shovel will pay for itself very quickly in savings alone —

OPERATING CAPACITY — Its 2,500-lb. capacity is 25% greater than has ever been available in a tractor-shovel of this size. Yet, it shuttles around corners, through narrow aisles, doorways and crowded yards, up and down ramps with speed and safety.

MECHANICAL FEATURES — The H-25 has a full reversing, power-shift transmission (no clutching) with two speed ranges forward and two in reverse, torque converter drive, power-steering (6-ft. turning radius), power-transfer differential and fast, powerful hydraulic bucket control.

A HOUGH DISTRIBUTOR is nearby to show you how the Model H-25 or a larger "PAYLOADER" (up to 12,000-lb. operating capacity) can increase output and lower costs on your bulk handling requirements. Contact him today or return the coupon below.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
755 Sunnyside Ave., Libertyville, Ill.

☐ Send H-25 "PAYLOADER" data

☐ Other "PAYLOADER" units to 12,000 lb. operating capacity

Name
Title
Company
Street
City State

4-A-2

FACTORY/EQUIPMENT NEWS

Begins on page 122

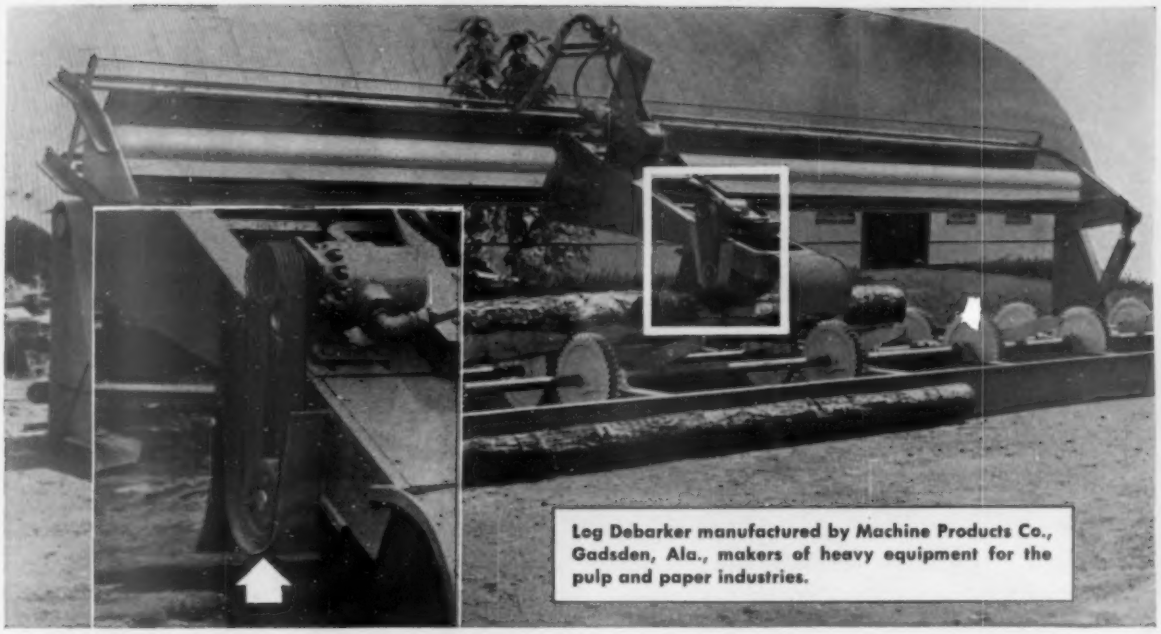
For more about these items, circle item numbers on Reader Service Card next to back cover.

138—Metal Trays and bench stands are for small parts storage and component bench assembly. Trays, 2½x4½ in., come in 5 widths from 3 to 7 in. Stands, in 18- and 36-in. widths, have leveling adjustments, buttons for easy sliding on assembly line. *Skyline Electronics, Inc.*

139—Hermetically Sealed Switch, rated 15 amp., 125 v., has wide application. Magnetic toggle is completely isolated from contact mechanism which is in inner gas-filled chamber. Extremely reliable, unaffected by corrosive or dirty atmosphere. *Space Components, Inc.*

140—Mobile Truck Loader, one-man operated, moves on retractable casters. Eliminates strain and exertion of loading. Rugged, all-steel unit has up to 3-ton capacity, rises to 25 ft. Electrical controls can be operated from floor or platform. *Atlas Industrial Corp.*

Turn the page



Log Debarker manufactured by Machine Products Co., Gadsden, Ala., makers of heavy equipment for the pulp and paper industries.

This V-Belt Drive costs less,

takes shock loads chain couldn't handle!

Another manufacturing problem solved by the high capacity of Gates Super HC V-Belt Drives...

The makers of the Log Debarker shown above found that the chain drive on the debarker head could not always handle the shock loads characteristic of this operation.

To insure buyers of this machine top performance and freedom from down time, Machine Products Company replaced the chain drive with a Gates Super HC Drive.

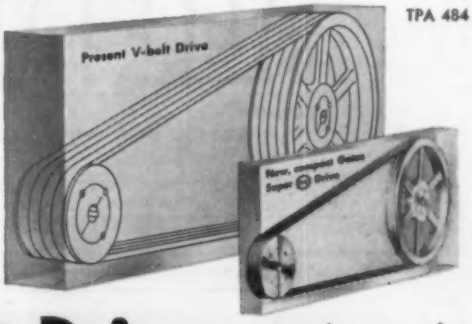
Not only have they eliminated down time and replacement costs from shock-load breakage of the chain, the makers have also actually cut manufacturing costs because the Super HC Drive permits a smaller debarker head.

Nation-Wide Engineering Service

A Gates Distributor or Field Representative will show you how Super HC V-Belt Drives reduce sheave diameters 30% to 50%, reduce drive space up to 50%, and drive weight 20% and more. To learn more about Gates Drive Engineering Service, ask him for a free copy of *"The Modern Way to Design Multiple V-Belt Drives"* or write the Gates Rubber Co., Sales Division, Inc., Denver, Colorado.

TPA 484

The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario



Gates *World's Largest Maker of V-Belts*

Gates Super HC V-Belt Drives

same hp capacity in smaller "package"

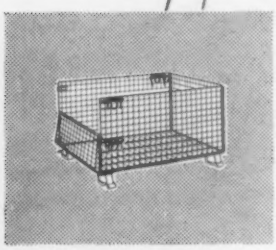
For more facts Circle 466 on Reader Service Card

USP Warehouse Palletainers cut inventory costs. Contents are always visible for rapid inventory. Hinged front section permits easy access, even when units are stacked. *Anything* contained by a 2" mesh can be stored more quickly and safely in Palletainers.

Serving industry everywhere!

Warehousing small parts in large quantities? USP Palletainers are the most practical, economical solution for achieving better space utilization plus efficient handling.

Specifically . . . USP Palletainers of the *warehouse* type offer you amazing versatilities for maintaining warehouse stocks conveniently — with contents always visible for fast, easy selection—plus savings in space—complete stacking safety, ease of transport and shipping. All these, plus the 75% storage space savings made possible by the *exclusive* "flat-fold" feature.



USP Warehouse type Palletainer features the half-drop end gate for easy access. 3,000 to 4,000 lb capacities.

USP Palletainers have eliminated the guesswork from warehouse parts handling and storage operation. See for yourself how easily they will solve your problems.

UNION STEEL PRODUCTS CO., Albion, Michigan

USP PALLETAINERS

GENTLEMEN:
Please send me complete information on USP Palletainer application.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

☐ Please have one of your materials handling engineers contact me at once.

FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

141—Hoisting Ladder, with self-dumping hopper, speeds up handling of sand, gravel, etc. Eliminates manual handling of aggregates, buckets, ropes, pulleys, etc. Needs no special skill to operate. Pedal controls load height, friction clutch holds load. *Bush Mfg. Co.*

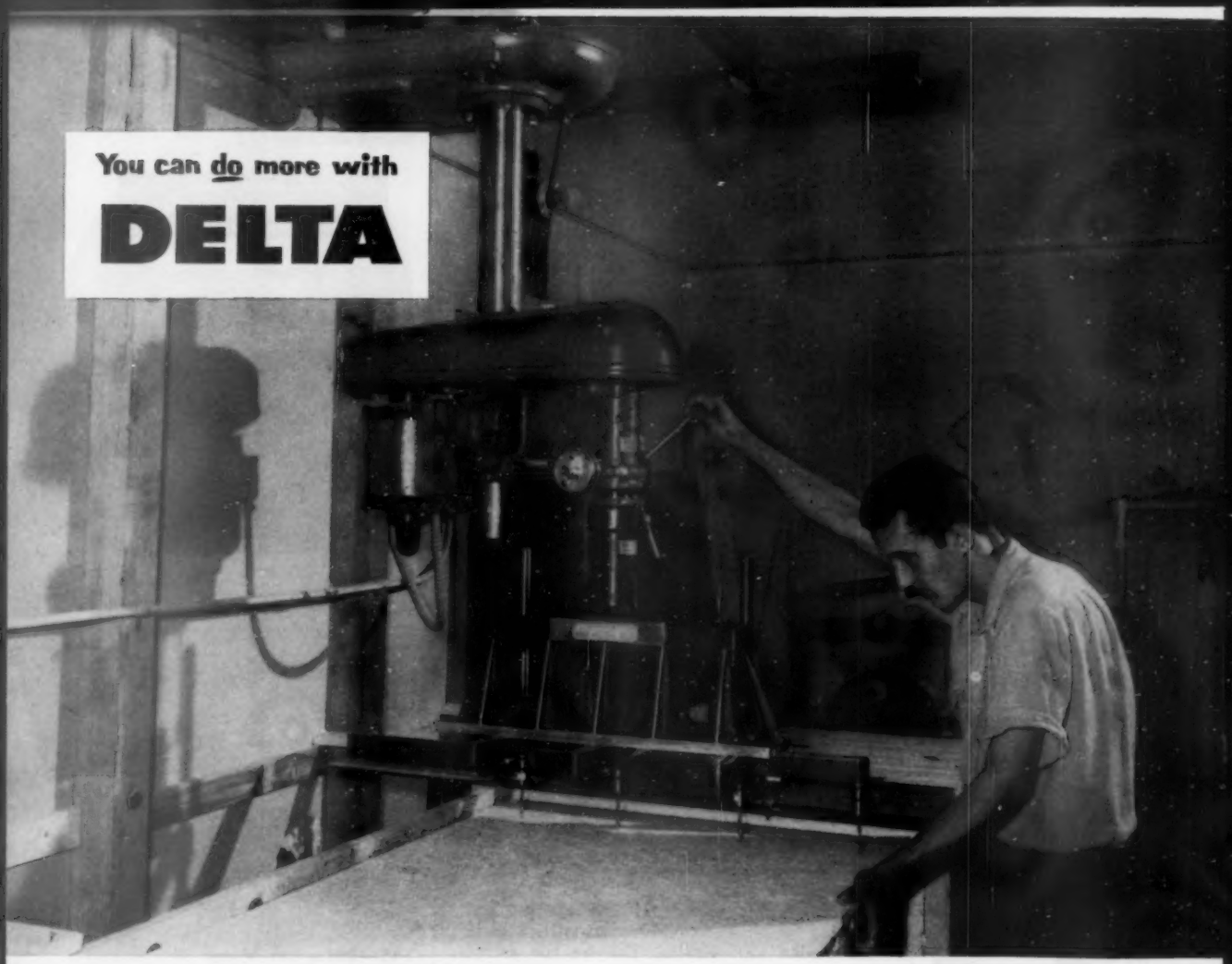
142—Vacuum Breaker fits any standard faucet and hose to automatically stop back-siphoning of contaminated fluids into main water supply line when water pressure fails. Prevents dangerous contamination of water. Resists temperature changes. *Fluid Devices, Inc.*

143—Carbon-Arc Burner is handy for emergency repairs on truck batteries, or for general heating jobs. Using 6-v. power from battery, flameless burner melts lead of intercell connector to terminal post. Interchangeable heating elements. *Electric Storage Battery Co.*

Turn the page

For more facts Circle 467 on Reader Service Card

For more facts Circle 468 on Reader Service Card ➤



Costs cut 50% in multiple hole drilling

Delta 17" Drill Press, also 20", 15", 14" and 14" Super-Hi Sensitive. Available in floor, bench and multiple-spindle models.

Suspending a standard 17" Delta drill press from an angle iron wall bracket over a table not only *doubled* productivity, but resulted in greater accuracy in wide panel drilling work for S & S Visual Company, a Brooklyn display firm. Use of a Commander multiple spindle drill head permits simultaneous drilling of up to 15 holes in a line 35" long. Avoiding costly single-purpose equipment, the firm used versatile, standard Delta components for this relatively inexpensive installation.

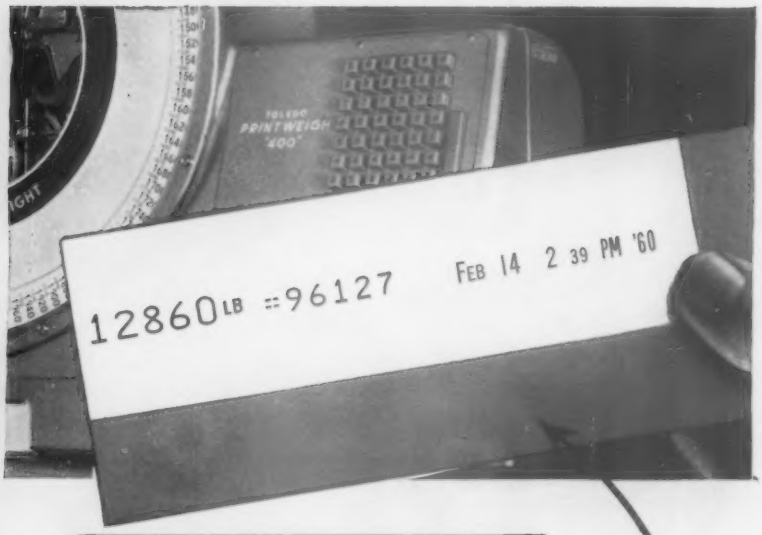
Every model in the world's most complete drill press line offers the power, precision performance and ruggedness that have set industry standards for years. Delta drill presses give you better value for your money—they cost less to buy, less to operate and less to maintain.

To match the tools to *your* needs, visit your Delta Industrial Distributor (listed under "TOOLS" or "MACHINERY" in the Yellow Pages). And for a FREE Delta Industrial Catalog showing 61 machines, 302 models, over 1400 accessories, write: Rockwell Manufacturing Company, Delta Power Tool Division, 628-DD N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ontario.

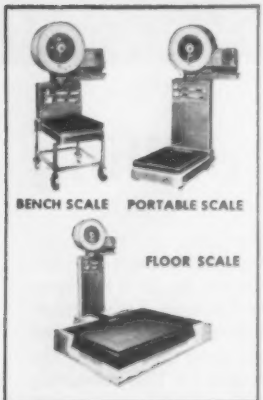
DELTA INDUSTRIAL TOOLS
another fine product by
ROCKWELL

Visit Delta in Booth No. 2046 at the A.S.T.E. Show

TOLEDO SCALES that *PRINT* Complete Weight Records for You . . .



. . . *THE ANSWER* to prevent "guesswork" and errors in cost control!



Toledo Printweigh Scales are available in a wide range of models, including Portable, Floor, and Bench types as illustrated; also Built-in, Hopper, Overhead Track and Motor Truck types.

Human errors in reading, remembering and recording weights are eliminated with Toledo Printweigh "400" Scales. They're the surest way to satisfy your requirements for weight records that are complete and indisputable.

Weights are printed in full figures, even when unit weights are used. Choice of printing on 8½" x 11" forms, or on tickets; also on strips. Weight data may be transmitted electrically for recording on remote adding or other office machines. "Memory" feature available for printing weight data, even after load is removed.

Toledo Printweigh "400" Scales give new flexibility and efficiency in weighing . . . to cut costs, guard quality, prevent profit-stealing weighing errors. Ask your Toledo representative for the full story on Printweigh Scales, or WRITE TODAY FOR BULLETIN 2017. TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio
(Toledo Scale Co. of Canada, Ltd., Windsor, Ont.)

"MISFIT" SCALES MULTIPLY COSTS

Scales can become "misfits" as a result of changes in plant layout, materials handling, inventory controls, value or quantity of materials weighed. If this has happened in your plant, the results can be costly. For example: weighing errors, production bottlenecks, materials handling inefficiencies. Be sure your scales are adequate for the job. Ask your Toledo representative about a scale adequacy check in your plant, or send for the Toledo Weight Fact Kit.

SERVICE

TOLEDO® *Headquarters for Weighing Systems*

FACTORY/EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

144—Mobile Work Platform eliminates scaffolding by providing safe, fast access to all overhead installations, inspection and maintenance work. Comes in several models, heights of 21, 26, 30 and 40 ft. Electrically operated with standby hand pumps. *Ontario Equipment Co.*

145—Induction Motor with wound rotor has Class B insulation system for thermal stability, outstanding moisture resistance and inertness to chemicals and dirt. For use where high-starting torque with low-starting current is required. *Westinghouse Electric Corp.*

146—Micro-Wire Welding uses 0.020- to 0.045-in. diameter wire to high-speed-weld sheet metal in light gages not easily welded by other processes. Also for such work as bridging ¼-in. gaps on 14-gage steel. Little distortion or post-weld cleaning. *Hobart Bros. Co.*

Turn the page

COME IN, THE ICE IS FINE. But what if your package can't take it? The question of temperature and humidity extremes is but one of many considered by CCA packaging engineers **before** they design the most efficient package for a specific job. Your product may never require direct icing, but the package for your product will reflect **this kind of advance planning.** To **pack it—move it—sell it** is the business of CCA packaging.

CCA

CONTAINER CORPORATION OF AMERICA

Chicago 3...and all key marketing areas. Folding Cartons, Shipping Containers, Sefton Fibre Cans, Molded Plastic Products

For more facts Circle 470 on Reader Service Card

US RUBBER ROYALASTIC TAPE

ROYALASTIC TAPE DOES TWO JOBS

It does the work of both rubber and friction tape.

- Complete mechanical and electrical protection.
- Good tensile strength and high resistance to abrasion and to water, oils, acids, alkalies and corrosive chemicals.
- Good stretch and easy to handle. Makes a neat, thin splice. Approved by Underwriters' Laboratories, Inc.

• • •

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

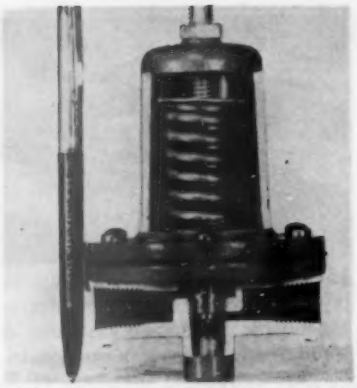
For more facts Circle 471 on Reader Service Card

FACTORY

FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.



147—Air-Gas Regulator controls inlet pressures (to 250 psi.) on wide range of instruments from regulating and recording devices to first stage regulator for LPG systems. The "080" regulator has outlet pressure ranges of 0-5, 5-35, and 35-100 psi. *Rockwell Mfg. Co.*

148—A-C or D-C Wattmeters (contact-making) indicate and control motor or other loads. Normal rating is 500 milliwatts; with modifications, d-c ranges are available down to 100 milliwatts. Can be built to operate on a-c frequencies to 1000 cps. *Assembly Products, Inc.*

149—Corrugated Steel Box, 33x48x 24 in., has square corners for maximum interior space. Rigid, it can be stacked to any height. Design features four-way entrance for moving and stacking with fork truck, and side with fork slots for rotary dumping operations. *Palmer-Shile Co.*

Turn the page

EMPLOYEE DIGNITY...

The Missus says:—

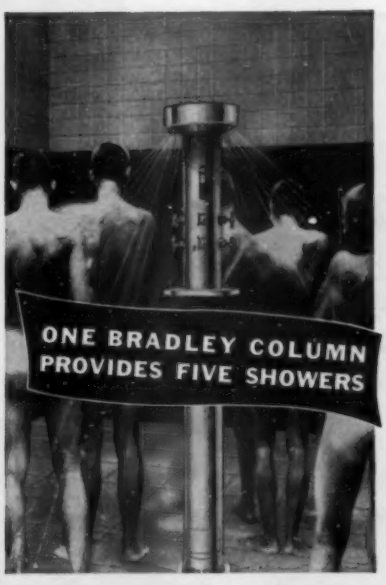
"John arrives home as trim as his neighbor who works in a bank."

Bradley

BRADLEY *multi-person showers*

PROVIDE MOST ECONOMICAL SHOWER BATHS

Shower baths can be installed at low cost since each Bradley Column (*Five* showers), requires only *one set* of piping connections. Each bather has individual control of water temperature and volume.



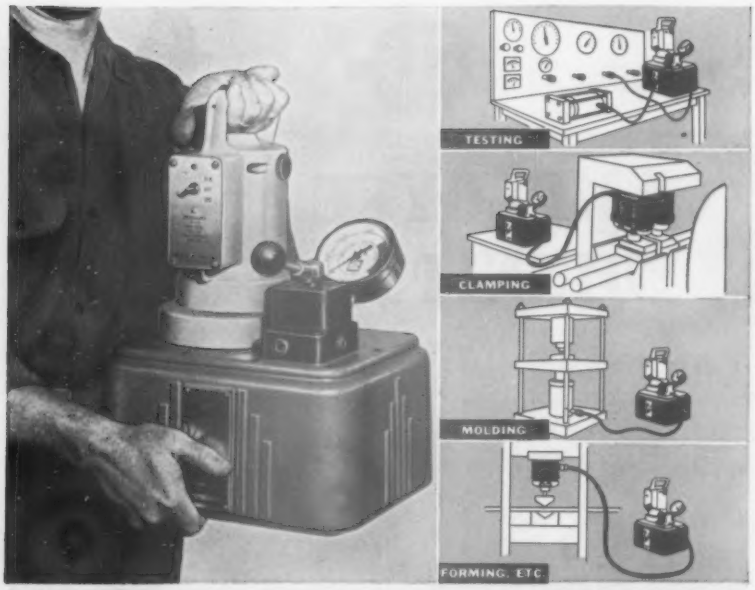
For women, stall-separating partitions and curtains are supplied.

A quick shower, a change to street clothes, and any employee regardless of his type of work or surrounding conditions can leave refreshed and trim. And according to dermatologist James W. Jordan of Buffalo, as reported in *Newsweek* "Shower before leaving work" is an important preventive measure.

For all details write for new Bulletin H-1322 to

BRADLEY WASHFOUNTAIN CO.
2215 West Michigan St.
Milwaukee 1
Wisconsin

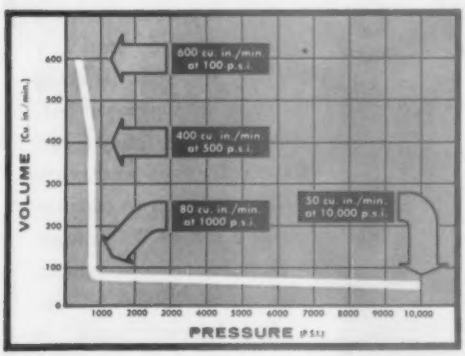
Write for new Bulletin H-1322



3½ Times Faster ram approach and return!—with new two-stage hi-pressure hydraulic pump!

- **DELIVERS FROM 2.6 GPM @ 100 PSI, 1.75 GPM @ 500 PSI, 80 CU.IN./MIN. @ 1000 PSI TO 50 CU.IN./MIN. @ 10,000 PSI!**
- **COMPACT: WEIGHS ONLY 45 LBS.; ONLY 17½" HIGH!**

Imagine the time you can save! . . . when your rams move to and from work 3½ times faster! . . . and up to 7 times faster between 150 and 500 PSI! That's what you save with the new OTC "Vanguard" complete pumping unit, as compared to any other single two-stage, hi-pressure unit of comparable size.


600 cu. in./min. at 100 p.s.i.
400 cu. in./min. at 500 p.s.i.
80 cu. in./min. at 1000 p.s.i.
50 cu. in./min. at 10,000 p.s.i.
VOLUME (Cu. in./min.)
PRESSURE (P.S.I.)
1000 2000 3000 4000 5000 6000 7000 8000 9000 10,000

All wearing parts are made of finest tool steel, heat-treated and ground and lapped to assure efficiency and long life.

A variety of valves, controls and accessories are available.

Here is a new and revolutionary product! Your interest in reading this far is well founded.

For more information on this and other OTC hydraulic products contact your OTC distributor, or write:

PRECISION HYDRAULICS DIVISION

OWATONNA TOOL COMPANY

399 CEDAR STREET **OWATONNA, MINNESOTA**

RESEARCH · ENGINEERING · DEVELOPMENT

OTC

Designers and manufacturers of the world's most complete line of Maintenance Tools and Hydraulic Equipment.

PULLERS AND PULLER SETS · HYDRAULIC RAMS AND PUMPS · HYDRAULIC SHOP PRESSES · HAND TOOLS

FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

150—Staple Nailer simplifies assembly of plywood shipping crates or expendable skids, and fastening of wood frames. Drives ⅞- to 1½-in., 16-gage staples, at pressures to 50 psi., at 5 per-sec. rate. Portable, weighs 5½ lb., features safety mechanism. *Fastener Corp.*

151—Ball Valve Line is designed for almost all fluids, semi-solids, compressed gases and air. Valves provide full flow, tight shut-off, quick quarter turns. Withstand heat up to 350 F., pressures to 700 psi. In ½- to 6-in. sizes, screwed or flanged. *Hills-McCanna Co.*

152—Gas Turbine Engine, for industrial use, uses no cooling water. Extremely lightweight (about 300 lb.), it produces 3 hp. per lb. Will require speed reducer for most loads. In 700- to 1000-hp. range, Model 720 burns liquid fuel; Model 722, natural gas. *General Electric Co.*

153—Tow-Mite moves loads in confined areas where small tractors are too light and large ones impractical. Compact (750 lb.), its 4-hp. gas engine develops 630-lb. drawbar pull. Turns on 38-in. radius. Fuel costs average 60¢ for 8-hour use. *Northwestern Motor Co.*

Turn the page

For more facts Circle 473 on Reader Service Card

For more facts Circle 474 on Reader Service Card ➤

Allis-Chalmers uses **RYKON** *Grease in bearing shield —offers farmers better disc harrow*

Situation: Bearings of a disc harrow in service are always turning in dusty conditions, oftentimes completely covered with soil. Such bearings in the Allis-Chalmers harrow are protected with grease-coated rubber shields. The grease guards against dirt getting past the shield and into the bearing.

What was done: Allis-Chalmers project engineer in the LaCrosse, Wisconsin plant, Maynard Walberg, called Fred Parkinson, Standard Oil lubrication specialist, for a sample of RYKON Grease. In conditions simulating field service, RYKON Grease was tested. Bearings were rotated in the most abrasive dirt available—Mississippi sand with a high quartz fraction.

What happened: Tests were started and run to destruction. Prior to the use of RYKON Grease, bearing failures occurred at 500 hours. On switching to RYKON Grease, these tests were pushed to 2,000 hours. At this point, tests were stopped. Bearings were still in operating condition.

What you can do: Find out how RYKON Grease might help you offer your customers a better product. Inquire of the Standard Oil lubrication specialist nearest you anywhere in the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Can RYKON Grease help you improve your product?

You expect more from **STANDARD** *and you get it!*

Maynard Walberg, Allis-Chalmers project engineer, and Standard Oil lubrication specialist Fred Parkinson, examine disc harrow bearing assembly. Fred is well equipped through training and experience to help industrial customers with lubrication problems. He has been doing this work for 11 years at Standard. He has a degree in chemistry and engineering from Brown University. Plus that, he has completed the Standard Oil Sales Engineering School.

Quick facts about RYKON Grease

- Heat stable. At sustained high temperatures RYKON Grease remains soft and grease-like.
- Resistant to water-washing.
- Mechanically stable. Minimum change in consistency in service.
- Resistant to oxidation. Thickener acts as an inhibitor.
- Exceptional rust-preventive properties.

make it

SPANG STEEL PIPE

When it's steel pipe . . .

. . . you're buying pipe with inherent strength and safety. Steel pipe is easy to thread, bend and weld . . . saves you installation time, helps keep construction costs down.

And when you install a steel pipe job, you *know* from experience that it will provide years of satisfactory, trouble-free service. Reliable steel pipe is first choice always for plumbing, air conditioning, steam and radiant heating systems, snow melting, refrigeration, ice rinks and structural uses.

When it's SPANG Steel Pipe . . .

. . . you're buying steel pipe with the *top-quality* reputation. Spang pipe is closely controlled during manufacturing and is thoroughly tested and inspected before shipping.

And when you order Spang, you *know* you're getting top-quality, the best available! Today, you'll find Spang Steel Pipe providing *top-quality* service in thousands of installations in schools, hospitals, industrial plants, office buildings, hotels, apartments, homes and many other types of buildings.

Get the complete story . . .

. . . of Spang Steel Pipe from our new Bulletin No. 509. It describes how Spang is made, shows many typical Spang installations, and contains valuable technical tables. We hope you'll write for a copy.

Meanwhile, your local Spang Distributor is at your service for all your piping needs. Next job, remember for best results: make it Steel Pipe . . . make it Spang! Made in the U.S.A.!

SPANG CW STEEL PIPE

THE NATIONAL SUPPLY COMPANY

Two Gateway Center, Pittsburgh 22, Pennsylvania

Subsidiary of Armco Steel Corporation

FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

154—Mobile Skid Turner needs only one man to automatically turn a skid load of 5000 lb. in 55 sec. Handles skids from 28x38 in. to 52x 76 in., loads from 24 to 75 in. high. Moderately priced, saves time, labor. Power: 3-hp., 220/440-v. motor. *Southworth Machine Co.*

155—Pressure Gages, of stainless steel, are for use in corrosive atmospheres. Meet ASA Grade B specs including accuracy of 2% at middle or working half of scale, 3% for remainder. In ranges to 5000 psi., dial sizes 2, 2½, and 3 in. *American Machine & Metals, Inc.*

156—"Guardlite" is attachment for surface grinders that serves as both safety guard and sighting light. Needs no makeshift back-of-wheel lighting. Two 40-watt bulbs give glare-free light. During grinding (wet or dry), steel shield protects glass. One size fits 90% of grinders. *Cutlas Tool & Mfg. Co.*

Turn the page

Using Weber "Hand Stenciling" System

PERSONAL PRODUCTS CORP. CUTS SHIPMENT ADDRESSING COSTS 43%

one man addresses 36 cartons in less than one minute

Quality and cost-conscious Personal Products Corp., prepared a detailed Cost Improvement Report. It showed their current addressing method took 7/100 minute per carton. In addition, it was a two-hand operation requiring substantial capital investment in addressing equipment.

A comparative test was made using Weber touch-stenciling. The result: addressing time was cut to 4/100 minute per carton . . . almost in half. And, the Weber system required no expensive equipment.

The Weber Tab-on stencil method was adopted, then there was a surprise! The one man doing all shipment addressing was addressing 30% faster than the Cost Improvement Test indicated. Using semi-live skids holding 36 cartons, he was addressing one full skid in about one-half minute. Here's the procedure:

1. Weber Tab-On Stencil is prepared in Tabulating Department. (See photos below)
2. Stencil is sent to shipping, where it is directly placed on a Weber hand printer. Only Weber hand printers have built-in ink reservoir containing fadeproof waterproof ink.
3. Cartons are addressed with a fast-one-hand "touch" motion in a "Ship To" label frame preprinted on carton by carton manufacturer. After addressing stencil is discarded—nothing to file.

Here's how the stencil is prepared by the Tabulating Department as a by-product of the shipping invoice.

Weber "tab-on" stencil, with carbon backing, attaches over Ship-To section of continuous invoice forms by pressure-sensitive edge.

Automatic accounting machines prepare invoice and address stencil simultaneously from punched card records.

Invoice forms are separated and stencil attached to Shipping Department copy. Shipping Dept. uses stencil to mark cartons.

Send for free bulletin on Weber "Touch-Stenciling" methods. Packed with ideas on addressing and marking multiple shipments.

Weber

MARKING SYSTEMS

Sales and Service in all principal cities

WEBER MARKING SYSTEMS, INC.
Dept. 17-D
Weber Industrial Park
Mount Prospect, Ill.

Send me your bulletin on "Touch-Stenciling" methods.

Company_____

Individual_____

Position_____

Address_____

City_____ Zone____ State_____

Instant bankruptcy! In a flash, fire can put you out of business. Protect dangerous flammable liquid hazards (like the coater shown above) with a *fully-automatic* Kidde carbon dioxide extinguishing system. Approved by U.L. and F.M., Kidde systems smother fire in seconds, leave no mess, turn off power and sound an alarm . . . get you back in production fast! Kidde's 35 years' experience can help you protect *any* hazard . . . write today and find out how.

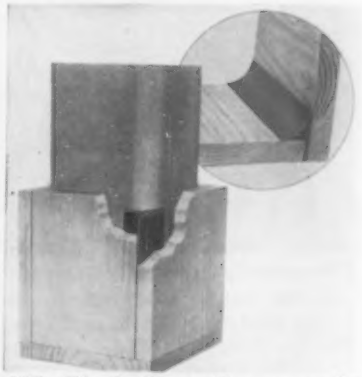
Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.
432 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.



157—Plastic Corner Former can be installed on standard forms to produce smooth, uninterrupted, round 1-in. radius corner on poured concrete. For use on columns, pillars, piers, beams, and panels. No need to chip or refinish. Re-usable. *Servicised Products Corp.*

158—Solid-Fill Ballast for fluorescent lamps has case, core, and coil permanently bonded into single unit. Results in cooler operation, low ballast hum. Thermo-setting compound, of 75% silica sand, resin, and catalyst, cannot soften or liquefy. *Jefferson Electric Co.*

159—Telephone Booth has acoustical lining that cuts noise and permits private conversation. Ideal for noisy plants. "Noise Shield" comes in wall-mounted or standing floor models. Accommodates pay phones, handset phones, intercom equipment. *Industrial Acoustics Co.*

Turn the page

LINK-BELT MOTOGEARS . . .

flexible motor selection
durable hardened gearing
available from stock

LINK-BELT Motogears permit smaller spare motor inventory

Motor's down! No time for delay! And no *need* for delay with a Link-Belt Motogear on the job. Pick a motor—*any enclosure—any make*—and switch in minutes. No need to drain oil. As for re-alignment, the rigid bracket makes it automatic.

Design-wise, there's none better. Among its features: oil-tight cast housing; quiet, hardened gears; straddle-mounted pinion that easily shoulders shock, reversing or heavy loads.

Double, triple and quadruple-reduction Link-Belt Motogears are carried in stock. Ratio range: 6.2:1 thru 985:1...up to 100 hp.

FOR FULL-LINE FACTS

on Link-Belt's comprehensive line of speed reducers—contact your nearest Link-Belt office or authorized stock-carrying distributor . . . or check and send this coupon to Link-Belt Company for data on all or any combination of the following:

- ☐ gearmotors—Catalog 2747
- ☒ motogears—Catalog 2747
- ☐ helical gear speed reducers—Catalog 2751
- ☐ shaft-mounted speed reducers—Catalog 2618
- ☐ worm gear speed reducers—Catalog 2324-A
- ☐ universal worm gear speed reducers—Catalog 2724
- ☐ parallel shaft speed reducers—Catalog 2619
- ☐ fluid drives—Catalog 2747
- ☐ P.I.V. speed changers—Catalog 2274

LINK-BELT

15,110

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"Call FOSTER... they'll ship Switch Material PLUS"

Right! L. B. Foster Company will ship switch material "*plus*" any standard rail section (new or relaying), crane rail and accessories, and track tools —everything you need, at lowest possible costs. Foster is your fastest, most dependable source for every rail and track item required for industrial sidings or in-plant trackage.

One more "*plus*": the advantage of lower freight rates from Foster's nationwide warehouses and stocking points. To help select materials best suited to your job, call the Foster Track Specialist.

Write L. B. FOSTER CO. for new catalog FA-4

PITTSBURGH 30 • NEW YORK 7 • CHICAGO 4
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Faster From Foster
PIPE • PILING • RAIL

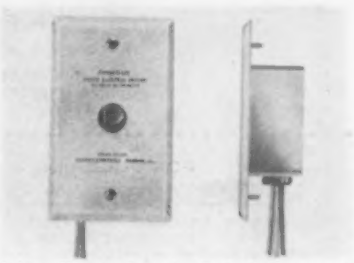
FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

160—"Buff-Ezy" cleans and deburrs copper fittings and tubing to 4 in. Precision machine eliminates slow, costly hand work, insures tight connections, prevents leaks and re-work. Portable, it weights 52 lb. Power: ⅓-hp., 115-v. motor. *Toledo Pipe Threading Machine Co.*

161—Hi-Pot Tester measures insulation leakage current in electric power, electronic and communication circuits, components, etc. Comes in a-c or d-c models with outputs to 30 kv. Meters show output voltage and insulation leakage current. *Associated Research, Inc.*



162—Photoelectric Switch has rectangular or round cover plate to fit standard outlet boxes. Automatically turns lights on at dusk, off at dawn. Operates with incandescent, fluorescent, neon, or mercury vapor units. Rating: 10 amp., 115 v. a-c. *Energy Kontrols, Inc.*

Turn to page 168

For more facts Circle 479 on Reader Service Card

For more facts Circle 480 on Reader Service Card ➤

NOW HE KNOWS WHY

lubrication is a management responsibility

MANAGEMENT *does* have a stake in good lubrication practices.

If you recognize lubrication for what it is — a cost-reducing tool, not an expense item — you can effect savings that add up to many hundred times the cost of the lubricants themselves. Yet only management has the authority to make these potential savings an actuality. That's why lubrication is your responsibility. **Texaco can help you achieve these savings.** Texaco Lubrication Engineers have had valuable experience in tailoring Organized Lubrication Programs to the needs of virtually every industry. They can help show *you* the way to important savings. Why not talk to your nearest Texaco Lubrication Engineer today — or write for our new Book "Organized Lubrication — Major Cost Control Factor."

Texaco Inc., 135 East 42nd Street, New York 17, New York. Dept. F-140

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

HOW PAGEMASTER® BY STROMBERG-CARLSON KEEPS PRODUCTION HIGH, DOWNTIME LOW

WHERE'S THE PRODUCTION ENGINEER . . . THE MAINTENANCE CHIEF . . . THE PLANT ELECTRICIAN?

Key men like these don't stay in one spot long. But you can't afford to waste time looking for them when a machine is down or a production line is halted.

You can find them in seconds with a Pagemaster® selective wireless paging system by Stromberg-Carlson—wherever they are in the plant.

Pagemaster paging is positive, instantaneous, completely selective. Each holder of a transistorized pocket-size receiver has his own private call signal. When he's wanted, *his* receiver—no other—alerts him with a tone signal. He picks up the nearest telephone and reports.

A Pagemaster system gives you the fast, sure way to reach the men you need to keep production at a maximum, downtime at a minimum.

Systems are available for *lease or purchase* . . . can be expanded to meet growing needs. For complete data, write to Commercial Products Division, 1402-04 North Goodman Street, Rochester 3, New York.

"There is nothing finer than a Stromberg-Carlson"

WITH PAGEMASTER YOU REACH THE PEOPLE YOU NEED WHEREVER THEY ARE IN THE PLANT OR OFFICE.

STROMBERG-CARLSON
A DIVISION OF **GENERAL DYNAMICS CORPORATION**

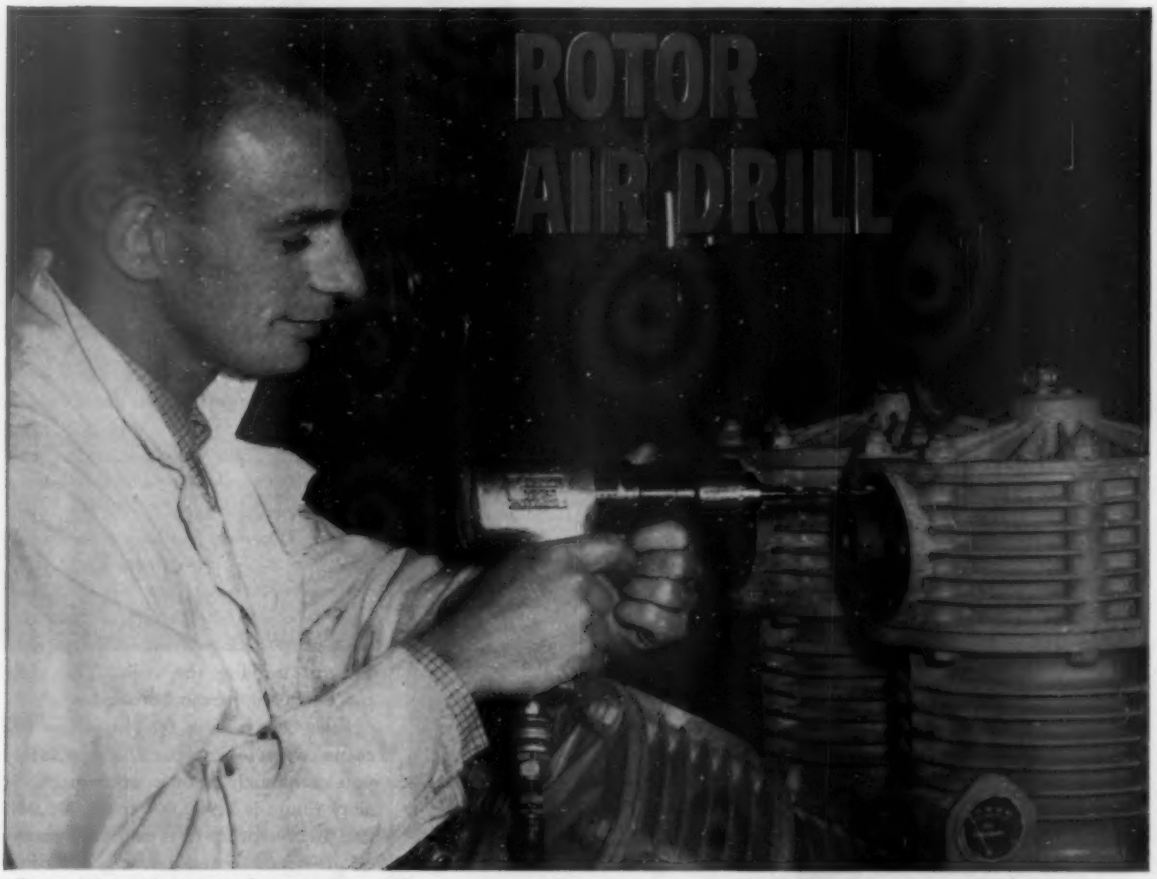
For more facts circle 481 on Reader Service Card

JOB: Drilling manifold stud holes in compressor cylinders. Formerly, with universal electric drill, it took 10 minutes per hole (and a lot of muscle).

RESULTS: Changeover to a Rotor E-01P Air Drill at 950 r.p.m. cut time to 4 minutes . . . netted a saving of 60%. Reduced operator fatigue and improved quality. The Rotor Air Drill has been in service a year without a cent for maintenance.

Find out how Rotor portable tools can improve *your* production. A demonstration in your shop will be made at your convenience. Write for free copy of Bulletin 53-B.

10-minute job now takes 4 minutes with



Courtesy Davey Compressor Company, Kent, Ohio

Here's the RIGHT TOOL for YOUR job!

ROTOR AIR TOOLS: Assembly Tools • Drills • Small Wheel Grinders Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers Special Tools • Air Motors

ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders • Polishers • Sanders

ROTOR TOOLS

The Rotor Tool Company · Cleveland, Ohio

SUBSIDIARY OF THE COOPER-BESSEMER CORPORATION

For more facts Circle 482 on Reader Service Card

3 Ways to Increase Production

1 PROVIDE PARTS CLEANING SOLVENT CANS AT THE MACHINE

Keep machinists doing productive work—eliminate unnecessary trips to centrally located parts cleaning station. Machine Bench Can attaches to machine or bench. Depressing fire safe Dasher dips parts; releasing pressure returns parts for draining. 10" x 7" x 8" deep; Capacity 2 gallons.

2 CLEAN SMALL PARTS AT WORK STATION IN AIR OPERATED MACHINES

Clean small machined parts in flammable solvents safely and automatically with Protectoseal Air-Matic Parts Washers. Require no attention from operator during wash cycle. Parts in basket are moved through solution to provide effective cleaning action. Operate on 35 psi. Cap. 6 gal; 30 lb. basket load; 15" x 15" x 25½" deep.

3 APPLY FLAMMABLES WITH AUTO MATIC PLUNGER CANS

Use automatic, fire safe Protectoseal Applicating Cans for assembly or cleaning operations requiring use of flammable solvents. Depressing dasher pumps a measured quantity of solvent into dasher cup to dampen swab, brush, or sponge. Saves time, solvent, reduces toxic or explosive vapor hazard. Made in 7 sizes; capacities to 2 gallons of solution.

Write for Protectoseal Catalog of fire-safe products for handling, dispensing, and use of flammable liquids in production operations.

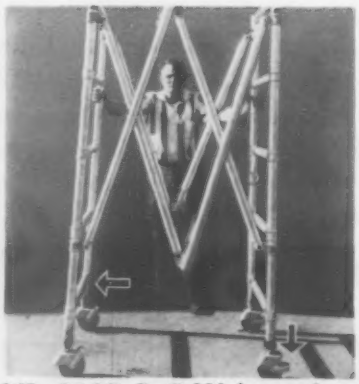
THE PROTECTOSEAL COMPANY

1962 S. Western Ave. • Chicago 8, Illinois

FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.



163—Mobile Scaffold is in one piece, without loose braces, nuts, or bolts. One man unfolds it in seconds. The V-X is 10 ft. long, 29 in. wide, rolls through doorways and down narrow aisles. Platform raises to 8½ ft.; legs adjust for uneven floors. *Up-Right Scaffolds.*

164—Paper Roll Towel, in 9x9-in. sections, is considered equal in drying capacity to towels dispensed in larger sizes. Specially developed "Merchant-Matic" cabinet has push-button release to dispense 9-in. sections. Roll fits most paper-towel cabinets. *Scott Paper Co.*

165—Plug-In Parts Feeder is mounted on press to transfer small stampings into die automatically. Feeds from 40 to 60 pieces per min. from operator-fed, preload station remote from die area. Safe to use. Increases production of stampings. *Press Automation Systems, Inc.*

Turn the page

NIAGARA SECTIONAL *Aero* HEAT EXCHANGER gives close temperature control, saves you LABOR, Power, Water

- **Because the new design improves the heat transfer to the out-door air by evaporation.**
- **Because new features keep your equipment working for long life with "new plant" efficiency . . . always full capacity.**
- **Because you save 95% of cooling water cost.**

You get faster, more accurate cooling of industrial fluids to specified temperatures.

You improve your quality of production by removing heat at the rate of input.

You save labor in upkeep. With full access to all interior parts and piping you see everything in easy inspections. You head off dirt accumulation and corrosion. Casing panels are removable without moving the coils. The coils can be cleaned from both sides.

First cost is low; freight is low because of the lowest space/weight ratio; you save much labor in erection. Capacity range is 7,000,000 to 18,000,000 Btu/hr. No other heat exchange method gives you so much saving in money and convenience.

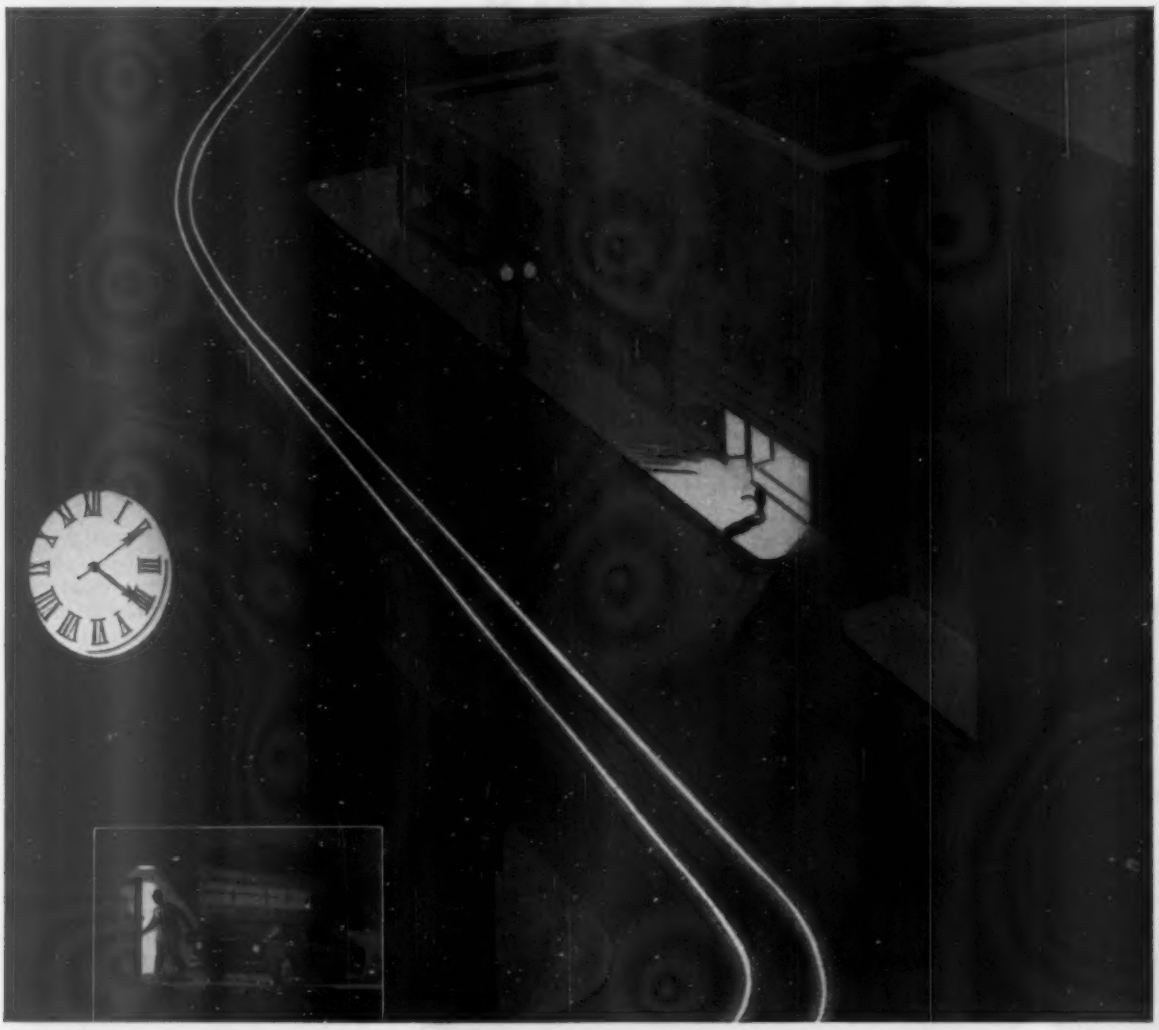
Write for Niagara Bulletin No. 132

NIAGARA BLOWER COMPANY

Dept. F-4, 405 Lexington Ave.
NEW YORK 17, N. Y.

District Engineers in Principal Cities of U. S. and Canada

ALLIS-CHALMERS



Trail of service that never sleeps

Backing up the broad line of Allis-Chalmers products are more than 200 field installation and service men. Available day or night, they respond promptly to the emergency needs of A-C customers.

Hundreds of other facilities, strategically located, provide "local" service support to Allis-Chalmers products wherever they are applied.

Regional offices, in key areas, serve as coordination centers.

District offices across the country cover every city or area wherever Allis-Chalmers equipment is used.

Certified service shops, independently owned, are only minutes away for expert round-the-clock service.

Warehouse stocks are within easy reach of all these service teams for fast delivery.

Ask your A-C representative about this coast-to-coast service organization, and the service support behind every product, or write, call or wire **Allis-Chalmers,** Milwaukee 1, Wis.

"Teamed" Equipment from A-C . . . Electrical Generation and Distribution Equipment. Pumps, Motors, Motor-Generators, Motor Control, Valves, Condensers, Blowers, Rectifiers, Dielectric Heaters, Turbines, Water Conditioning, Earth Moving and Material Handling Equipment.

A-1275

For more facts Circle 485 on Reader Service Card

EFFICIENT REMOVAL OF DUST AND CHIPS

• *SNAGGING* • *GRINDING* • *CHIPPING*
• *MACHINING* • *BUFFING* • *POLISHING*
and similar operations

Whatever your problem in industrial dust control, call on Kirk & Blum, an organization of engineers and mechanics with more than 50 years' experience in this specialized field.

You secure a complete service from Kirk & Blum . . . DESIGN, FABRICATION and INSTALLATION . . . with a single responsibility for an *efficient* dust control system.

For an analysis of your dust control problem, call on Kirk & Blum's expert engineering service. Write today for complete information and a K & B survey.

The Kirk & Blum Manufacturing Co.,
3209 Forrer Street, Cincinnati 9, Ohio

KIRK & BLUM
DUST CONTROL SYSTEMS

FACTORY / EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

166—Tape Dispenser has cutting assembly of chrome-plated steel that produces clean slice with snap action of top. Clear plastic case provides simple, dirtproof way to handle ½-in.-wide tape. Holds 288- or 567-in. rolls. Easy to open and reload. *Crane Packing Co.*

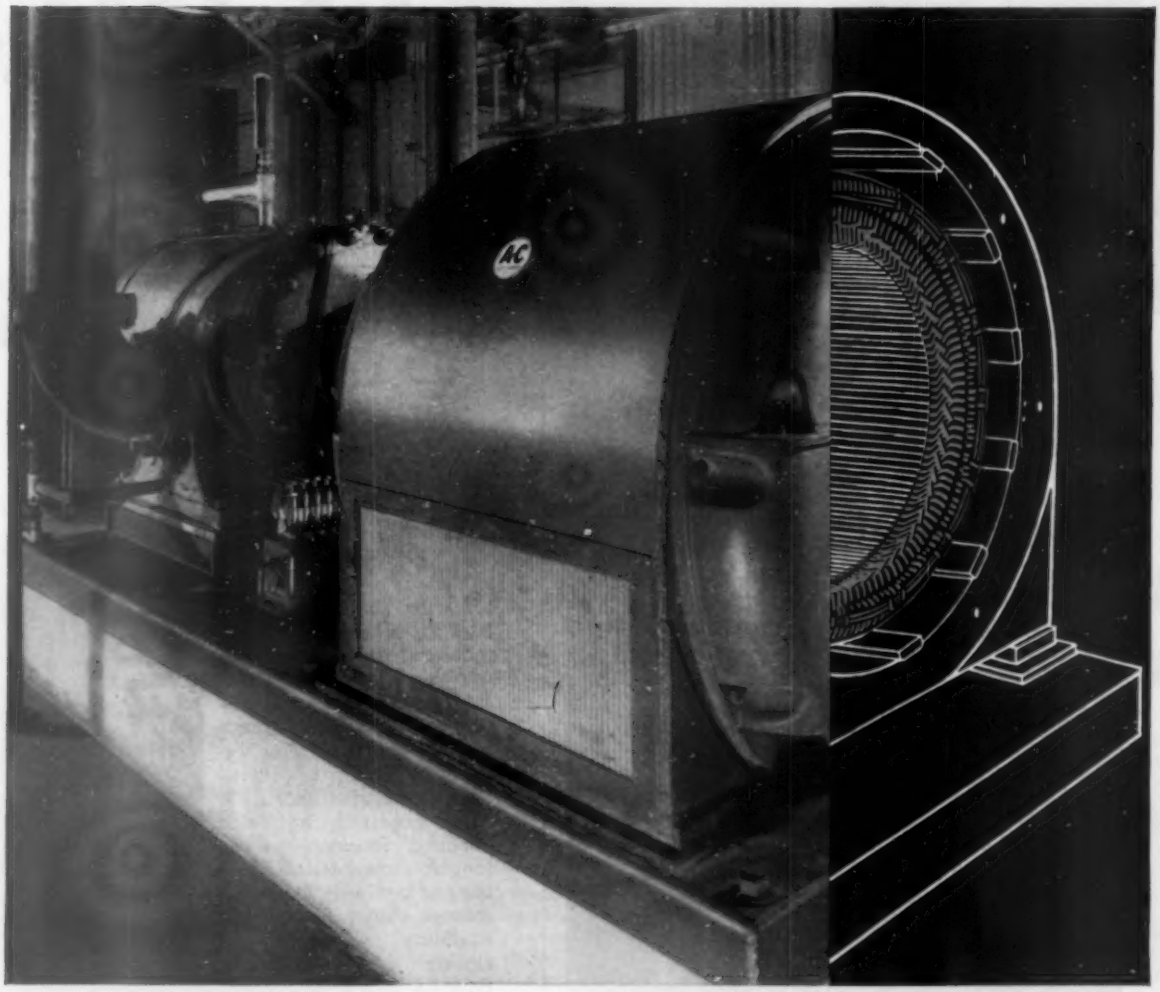
167—Vaportight Light Fixture requires no tools to remove guard, globe, or reflector for re-lamping and cleaning. Special white coating protects metal from corrosive salt spray, acid fumes, strong caustics, etc. Several types in 100, 200 watts. *Pyle-National Co.*

168—Magnetic Sweepers come in one-hand-operated tube magnet models to large units for truck or tractor towing. Pick up scrap iron that could injure personnel or cause costly damage to machines and equipment. For floors, aisles, loading areas, etc. *Magni-Power Co.*

169—Self-Stacking Bins have expanded top rim into which another bin can be placed. Loose material stored in bins is instantly accessible through spout-type front. Front labeling permits instant identification of contents. Comes in five sizes. *Bay Products.*

Turn the page

ALLIS-CHALMERS



Silco-Flex insulation in this compressor application provides complete protection against practically every enemy of motor insulation.

Your major motor investments are protected by Allis-Chalmers

invisible standards of perfection

Allis-Chalmers motors prove the value of thinking beyond established design standards. This thinking, applied to research, development and manufacturing, has led to advanced design features which mean greater application versatility, exceptional reliability and extended motor life. These are invisible standards of perfection you get with Allis-Chalmers motors.

Silco-Flex insulation, for example, has completely changed the rules on open-motor application. It is impervious to moisture, oils, and most acids, alkalies and solvents. It is resistant to abrasion, and is capable of withstanding high temperatures. Its resilience provides durability to withstand shock and vibration.

Super-Seal motors, with *Silco-Flex* insulation, have proved themselves for more than five years under the most severe conditions in industry.

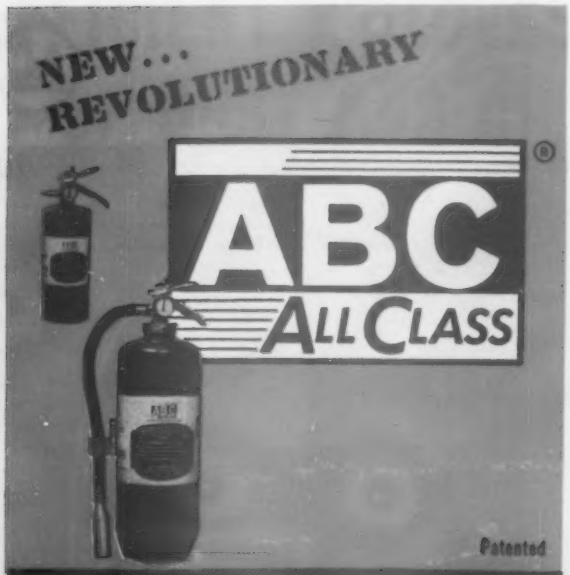
Advancements such as capsule bearings, split end housings, and *Integrated* field coils (for synchronous motors) add to the superior performance of *Super-Seal* motors.

They contribute to the invisible standards that protect your motor investments year after year — cut replacement costs — assure uninterrupted production.

To learn more, call your nearby A-C representative, or write ***Allis-Chalmers,*** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1297

Super-Seal and Silco-Flex are Allis-Chalmers trademarks.

NEW... REVOLUTIONARY



THE ONLY FIRE EXTINGUISHERS APPROVED BY UNDERWRITERS' LABORATORIES FOR ALL CLASSES OF FIRES: CLASS A, B, C AND MAGNESIUM

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Fire Retardant Paints
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172 For more facts Circle 488 on Reader Service Card

RECOIL!

RUBBAIR® DOORS have "recoil-ability".

. . . the ability to bounce back from impact of heavy industrial or fork-lift truck equipment. Because RUBBAIR DOORS are made of rubber, they flex and absorb heavy punishment, far beyond the capacity of conventional metal-clad doors.
The "recoil-ability" and "bounce" feature gives you longer factory-tested door life and extremely low maintenance costs. The rugged flexibility and automatic closing of RUBBAIR DOORS assure trouble-free operation, safety, lowered heat loss and cleanliness.

Remember . . . only RUBBAIR®DOORS have *"recoil-ability"!*

Money saving features of RUBBAIR DOORS are:

- Flexible Construction
- Safety Cushion Nose
- Scuff-Resistant Wear Panels
- Rugged V-Cam Hinges
- Positive Air Seals
- Shatter-proof Windows

If you have an industrial door maintenance problem, "recoil-ability" may solve it. Write for details, today.

® MANUFACTURING CO., INC.
Stic-Klip
RUBBAIR® DOOR DIVISION
60 Regent Street
Cambridge 40, Mass.

Distributorships available in protected territories.

For more facts Circle 489 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.

170—Dryer for compressed air and other gases works automatically on 6-hr. cycles. It adsorbs moisture, heats for regeneration, cools without supervision. Interchangeable parts are accessible for easy maintenance. Little lubrication. *McGraw-Edison Co.*

171—Fluorescent Fixture is weatherproof for installation on loading docks, canopies, etc., in addition to indoors. Housing is extruded aluminum channel with cast-aluminum end caps. Has shatterproof plastic lens. Reflector is removed quickly without tools. *Crouse-Hinds.*

172—Dumper Attachment, for all lift trucks, hydraulically raises drop-bottom boxes to desired height, then dumps them. Low cost, simple to operate. Comes with hanger blocks to mount on any carriage. Capacities: 4000, 6000, 8000, and 10,000 lb. *Little Giant Products, Inc.*

Turn the page

Save up to ⅓ on the cost of your next conveyor...new handbook shows how

Tells how to cut planning and installation costs with pre-engineered, ready-built conveyor components for immediate or future handling needs

Install a conveyor system to meet your specific materials handling needs today . . . tomorrow . . . or in years to come. Using Standard's Handidrive handbook, simply order pre-engineered, prebuilt interchangeable conveyor components to which additions or alterations can be made as required.

"Do-it-yourself" buyer-users will find Handidrive assembly is fast, easy. The pre-engineered stock units include: roller conveyors (either gravity push-along or live roller type), inclined belt conveyors, drive units, intermediate sections, curved sections, supports, hangers and other miscellaneous items.

Lower initial cost — you buy only what you need — is only one of many Handidrive "off-the-shelf" benefits. The Handidrive handbook gives full details! Get your copy now . . . free of charge, of course.

3 plans to help you select and order simplified HANDIDRIVE pre-engineered units

"Do-It-Yourself" Plan — Determine your conveyor requirements, then select stock units from Handidrive handbook.

"Recommendations-Requested" Plan — On your request, a Standard specialist will advise you on installation of a custom-tailored Handidrive conveyor

"Leave-It-All-To-Standard" Plan — Standard's staff of experienced engineers will work out your handling problems of a more complex nature.

STANDARD
GRAVITY & POWER CONVEYORS
Sales and Service in Principal Cities
OVER 50 YEARS
of conveyor experience

STANDARD CONVEYOR CO.
North St. Paul 9, Minn., Dept. G-4
Please send me a free copy of your new Handidrive handbook.

Name.....
Company.....
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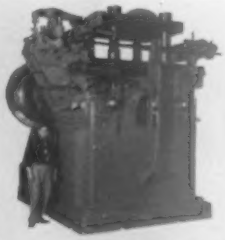
City.....Zone.....State.....

For more facts Circle 490 on Reader Service Card



"WE RECOMMEND LUBRIPLATE FOR HENRY & WRIGHTS"

—says
The Hydraulic Press Mfg. Co.
A Division of Koehring Co.
of Mount Gilead, Ohio

"We have had excellent results with LUBRIPLATE in our new double crank design Henry & Wright Dieing Machines which we recently acquired from Emhart Mfg. Co., Hartford, Conn. This follows the same fine results Emhart had with LUBRIPLATE in single crank Henry & Wrights for many years. In the Operating Manual that goes with every new Henry & Wright machine, you will find that we recommend LUBRIPLATE."

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

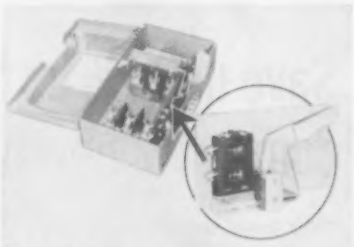
174 **Circle 491 on Reader Service Card**

FACTORY/EQUIPMENT NEWS

Begins on page 122

For more about these items, circle item numbers on Reader Service Card next to back cover.

173—Shockproof Steering Wheel has automatic clutch built into hub to eliminate shocks and kickback. Reduces driving fatigue, protects against hand and wrist injuries. Installs in few minutes on standard shift of lift trucks, tractors, trucks, etc. *Kosch Mfg. Co.*



174—Interlock Kit permits easy field installation of additional contacts in safety switches. For use with complete line of heavy-duty safety switches. Interlocks are supplied with one normally open, one closed contact. Actuated by handle of switch. *Square D Co.*

175—Degree-of-Bend Scale quickly and accurately indicates extent of bend on any ½- to 6-in.-diameter pipe. Fits any hydraulic pipe and conduit bender operating in a horizontal position. No need to waste time on the job figuring out degree of bend. *Greenlee Tool Co.*

Turn the page

MAINTENANCE floor to ceiling!

with Vanguard

Self-Propelled

SHOP-VAN

Model 210

TOTES A TON of tools, parts, supplies, on the job . . . to the job.

CONVENIENT AND EFFICIENT . . . no trudging back and forth from job to supply depot for tools or parts.

WORKSHOP ON WHEELS . . . mount bench grinder, drill press, pipe-vise, etc. on thick steel table top for on-the-spot repair, maintenance or assembly.

WELDING EQUIPMENT can be towed by the Shop-Van for fast, portable service, repair and assembly.

TELESCOPIC WORK PLATFORM . . . completes usefulness of Shop-Van. Ideal for overhead maintenance and assembly.

HEAVY, UNITIZED ALL STEEL welded construction, steel top, 16 drawer cabinet, two sliding-door cupboards.

write today for free catalog

Vanguard

MANUFACTURING COMPANY
1908 E. 66th St. • Cleveland, Ohio

Circle 492 on Reader Service Card

Vidmar industrial storage cabinets solve

The case of the MISSING TOOL

Is the supply exhausted? Was it broken? Or is it somewhere in the dark corners of a cluttered storage area?

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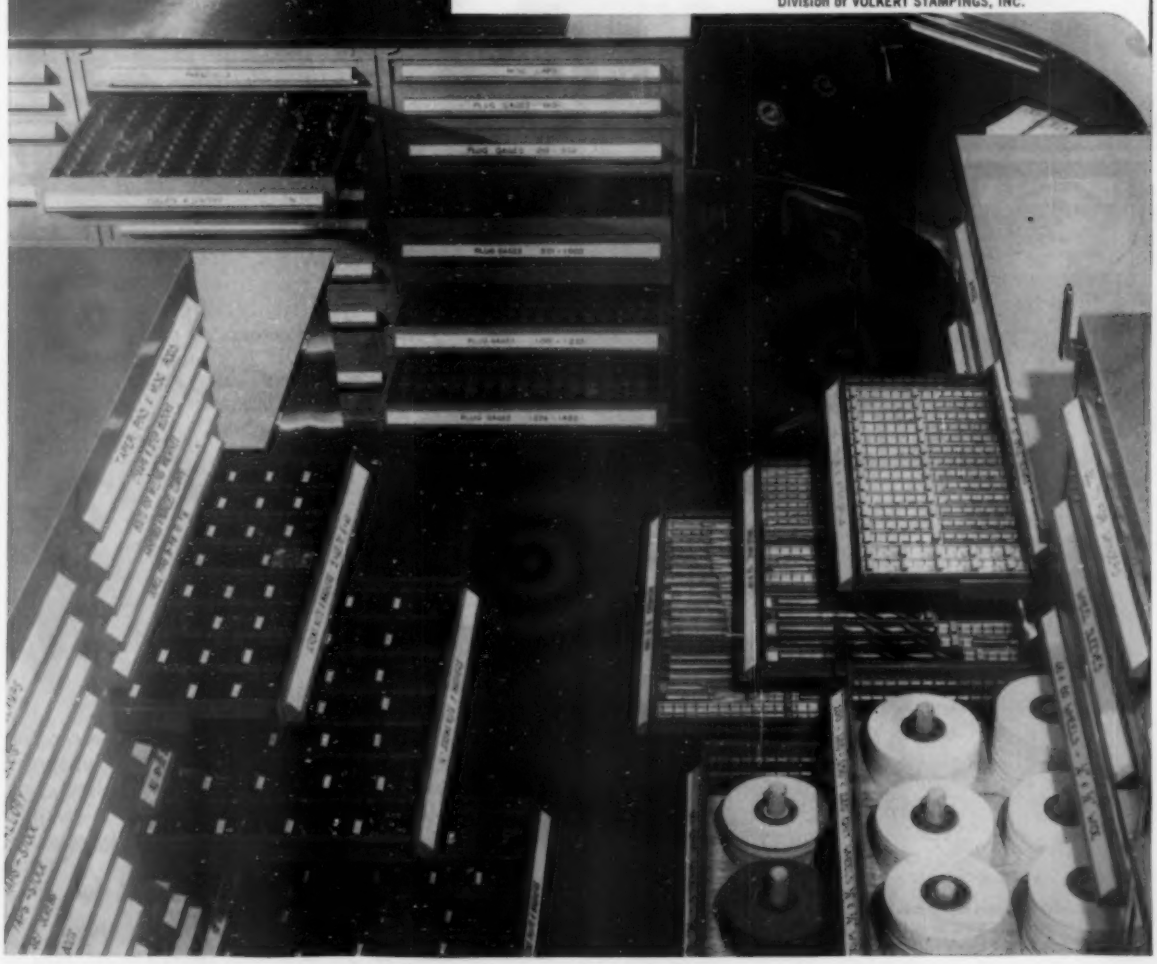

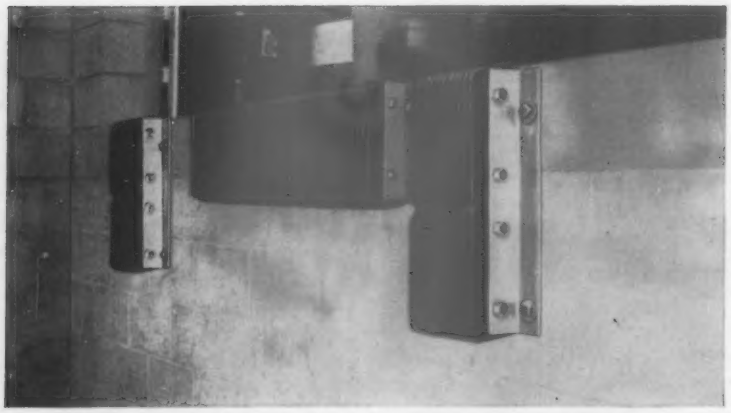

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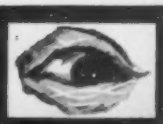

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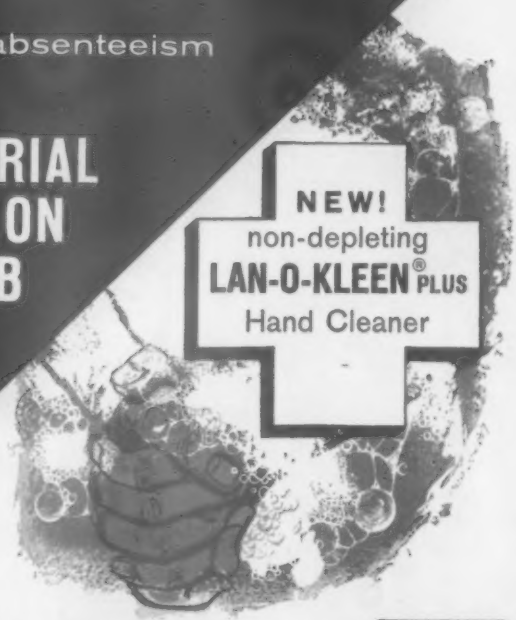

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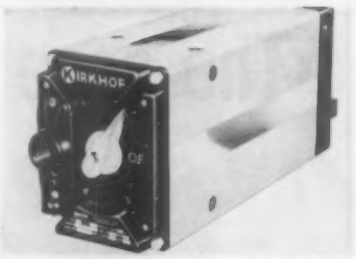

176—Welding Transformer uses epoxy resin insulation rated at 110 C. Makes high production welding completely safe and practical. Ratings: 60, 70, 90, and 130 kva. Long operating life, little maintenance, protection against intermittent overloads. *Kirkhof Mfg. Corp.*

177—Panel Meters, voltmeter, ammeter, or milliammeter, withstand mechanical shock and electrical overload of 1000% or more. Lightweight meters are ½ in. thick, plus mounting screws. Milliammeter ranges to 1 amp., voltmeter to 500 v. *Parker Electrical Instrument Corp.*

178—Electronic Air Cleaner comes in five low-priced models that need little space, operate at 90% efficiency. High-capacity units have ionizing-collecting cell plates spaced 5/16 in. apart. Horizontal or vertical air flow, 800 to 10,000 cfm. *Electro-air Cleaner Co.*

179—Absorption-Type Silencer, for high velocity air or gas flow, shows little or no resistance to flow. For use in environments comparatively free of moisture, and with temperatures to 210 F. Comes in 10 sizes for up to 4 in. pipe; 500 cfm. *Universal Silencer Corp.*

Turn the page

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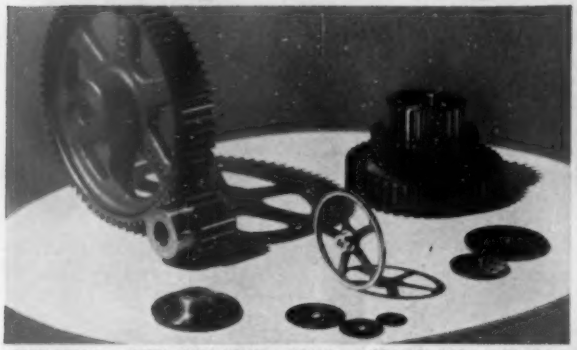
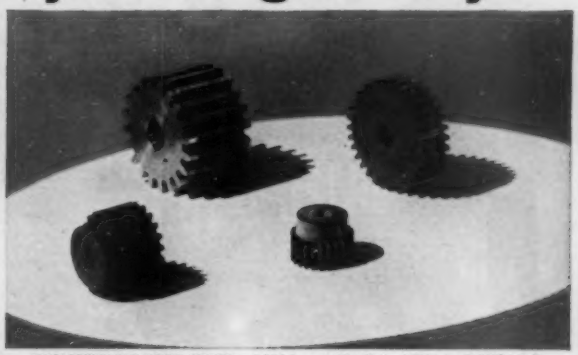
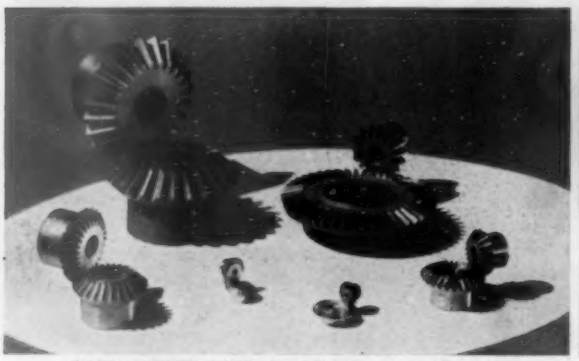


SPUR GEARS — STEEL, IRON, BRASS 14½° and 20° P.A. .208" to 40" P.D.



NON-METALLIC SPUR GEARS 14½° and 20° P.A. .938" to 6.667" P.D.



BEVEL and MITER GEARS Steel, Iron, and Brass 20° P.A. .312" to 14" P.D.

STEEL SPIRAL MITERS 1" to 5" P.D.
HELICAL GEARS Steel and Bronze .333" to 6" P.D.

RACK • PINION WIRE Steel and Brass 14½° and 20° P.A.
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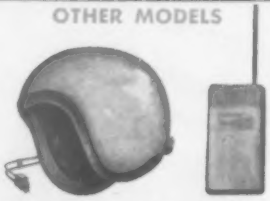

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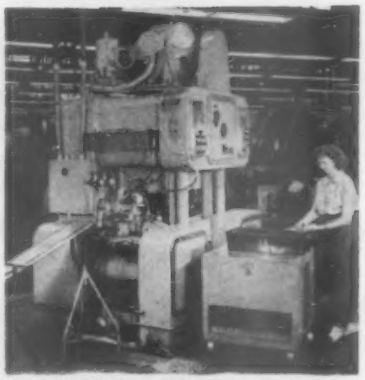

180—Metalworking Press has no gears in drive mechanism, yet reaches speed of 450 strokes a minute. Can blank "E"- and "I"-shaped 0.025-gage silicon steel magnet and armature-core laminations at this speed. Constant motion of dies assures long life. *Wean Equipment Corp.*

181—Wiper-Scraper Seal combines rod wiper and scraper in single unit. Provides low-cost protection for packings on reciprocating shafts and hydraulic cylinders exposed to heavy dirt conditions. Comes in shaft sizes from ½- to 6-in. diameter. *Chicago Rawhide Mfg. Co.*

182—Ventilating Fan has motor and fan bearings mounted on rubber isolation rails to eliminate vibration and noise. For applications requiring low and medium ranges of volume and pressure. In 12 sizes; capacities from 688 to 23,000 cfm. *Ilg Electric Ventilating Co.*

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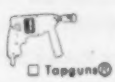
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Now, for the first time, you can standardize on one wheel for all your materials handling equipment in any section of your plant. Regardless of the types of floors or floor conditions, Fairbanks new "LAMILON" Wheels will:

- Protect your floors. "LAMILON" Wheels stay smooth and concentric, will not mar or mark, because of exceptionally high impact strength and abrasion resistance.
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- Last longer and give more dependable service than any other plastic wheel.

"LAMILON" Nylon-Reinforced All-Plastic Wheels are available in sizes 3 through 12 inches and can be furnished with thread-tight thread guards.

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183—Heavy-Duty Nibbler is lightweight and portable, yet easily cuts through ¼-in. cold or hot rolled steel and up to 5/16-in. aluminum at 35-in.-per-min. rate. Leaves surface clean and smooth without distortion. No deburring, grinding, buffing. *Fenway Machine Co.*

184—Round Chart Recorder boasts accuracy of ±¼%. Most plug-in components are interchangeable with G-E strip-chart models. Servicing features are: face to expose internals, printed circuit boards. Accessories include re-transmitters, integrators. *General Electric Co.*

185—Electronic Counter automatically measures, on 5-place readout, frequency and random events per unit of time, or totalizes electrical events. Has 1 cps. to 1.2-mc. range. With transducers, it also measures speed, rpm., weight, pressure, heat. *Hewlett-Packard Co.*

186—Switch Transfer, with dual cylinder, automatically cuts out power source that failed and cuts in emergency power source. Useful where service interruption could be disastrous. Time device allows up to 30-sec. delay to permit circuit breaker action. *H. K. Porter Co.*

Have You Had Your Degreasing Operation Checked Lately?

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...featuring stainless steel: water, soda-acid, foam and loaded stream units!

CLEAR WATER, Pressurized or Cartridge Type—2½ gal.	LOADED STREAM, Pressurized Type—2½ gal.
ANTI-FREEZE, Pressurized or Cartridge Type—2½ gal.	FOAM—2½, 20, 40 gal.
PUMP TANK (Anti-Freeze or Plain Water)—2½, 5 gal.	VAPORIZING LIQUID, Pressurized Type—1, 2 qt., 1 gal.
SODA-ACID—2½, 20, 40 gal.	VAPORIZING LIQUID, Hand Pump Type—1, 1½ qt.

Pyrene C-O-TWO

products of **THE FYR-FYTER COMPANY**, Dayton 1, Ohio

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FACTORY

PLANT OPERATIONS CASE BOOK

OPENS BY RADIO

This charging truck operator has fingertip control of opening and closing furnace doors at Union Carbide's Haynes Stellite plant. A radio in the truck activates a receiver alongside the furnace, which, in turn, energizes the door control. Heat doesn't hurt the equipment . . . page 185.

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NORMAN H. SOLON, EDITOR

No. 30 April 1960

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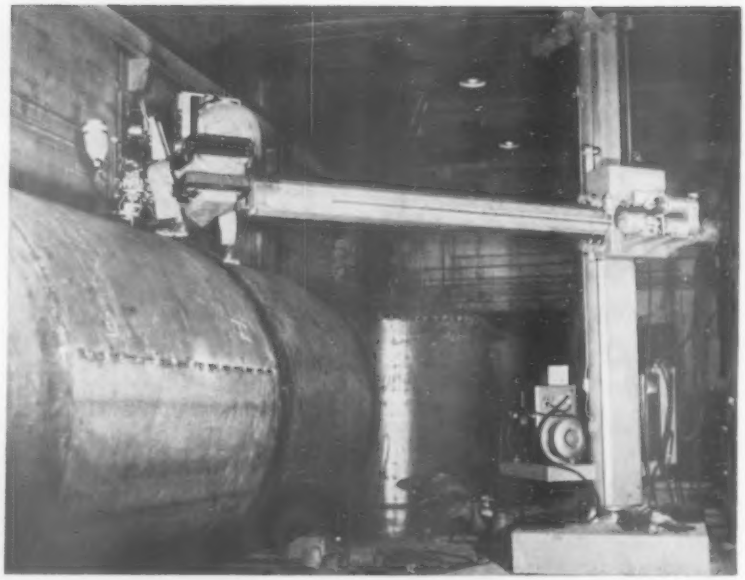


Welding Machine Is Three-Way

This mobile welding machine is overcoming the space barrier at Bishopric Products Company, Cincinnati. An operator sitting in a cockpit can perform welding operations anywhere within a 24x80-ft. area and at heights up to 14 feet.

Here's how: The operator and welding head are mounted on a free-swinging tubular boom which can be elevated almost 5 yards. The boom, in turn, rotates on a dolly, permitting circular welds of 24 feet in diameter. The dolly is mounted on rails and can travel a distance of 80 feet. To make the machine even more versatile, the boom can be fed in or out for straight welds at right angles to the track.

The welding cockpit looks no less complicated than its airplane counterpart. Controls for welding voltage, wire feed, and boom and dolly travel speed are located there. Buttons for inching the wire, boom, and dolly into a precise position are also within easy reach of the operator's fingertips.

Above the area served by the welding machine is a traveling crane that can set the weldments in position and shift them as required. And straight-line welds can be made either by traversing the track carriage or by traversing the boom parallel to its horizontal axis.

With this method, the welding machine can be active a good part of the time. And is no longer idle pending completion of a set-up.

The fixtures were built by Pandjiris Weldment Company, St. Louis; the welding machine by Hobart Brothers, Troy, Ohio.

Air Leaks Check These Lip Seals

Lip seals, used to retain lubrication in automotive parts, are electromechanically inspected at plants of General Motors Corporation. With an air measurement device, the

Sealector, engineers can fix seal standards, improve quality control, reject seals with eccentric shapes.

The device consists of a calibrated flowmeter, connected with a regulated air supply, and a two-diameter stub shaft with preset upper and lower tolerance levels.

The operator clamps the seals in a cylindrical cavity containing the stub shaft (photo). Air pressure of half a pound per square inch then fills the enclosed cavity. If air passes the seal into the atmosphere, the flowmeter electronically indicates the quantity.

If no air leaks by, the seal is oversized. If some air escapes, the tube shaft is raised until its larger diameter is in the seal. If it still continues to leak, the seal is oversized, eccentric, or both. It's then rejected. Otherwise, it's accepted as within tolerance.

Changing Lamps the Easy Way

Here's one way of changing burned-out lamps on high ceilings without spending time and money in setting up scaffolding. These telescoping aluminum towers are used by the Stockton, Calif., School System for lighting and heating installation and maintenance in gymnasiums and indoor swimming pools.

Folded down to pass through doorways, the towers can roll to the fixtures, extend to required heights in minutes. The Tallescope (Up-Right Scaffolds, Berkeley, Calif.) is equipped with a safety tread ladder and enclosed platform.

Radio Opens and Shuts Furnace Doors

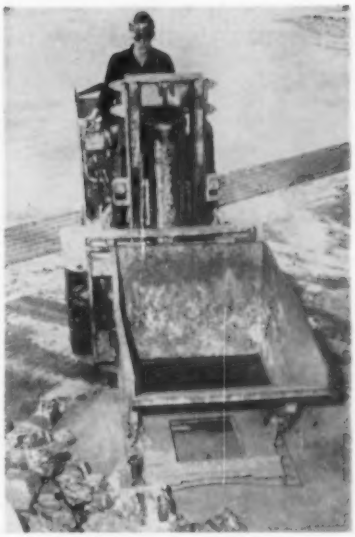
(Cover story)

Furnace doors are open and shut by radio control located in a charging truck at Haynes Stellite Company (Kokomo, Ind.). Here's how:

The truck approaches a furnace, moving along a traveling cable from a payout reel fed from the shop's 440-volt system. Operator pushes a button to activate the receiver beside the furnace, which, in turn, energizes a motor opening the door. When the operator wants to close the door he pushes the button a second time. Any one of four furnaces can be controlled from the truck. A given frequency is the key to each door. Each frequency is different from the others, eliminating any chance of signal mixing.

No adverse effect from the heat on the radio equipment has been reported. The receiver is encased in a steel box designed mainly to protect it against dirt and dust rather than against excess heat.

The plant previously used an electric charging car run on an overhead crane to the furnace. But the hydraulic system on the car constantly gave trouble through leaks and inefficient operation. It was also bulky and hard to manipulate.



Manganese Steel Boosts Hopper Life

Highly abrasive lump and crushed ferro alloys were rapidly wearing out hopping bottoms at Tennessee Products & Chemical Corporation's Rockwood, Tenn., plant.

To solve the problem, Roura Iron Works, Inc. (Detroit), custom-built hoppers using manganese steel. These special bottoms are now providing longer life than the conventional steel bottoms used before.

FAST MOVE FROM TRUCK TO WORK BENCH

Moving material fast can be a key profit factor in any plant, especially one that manufactures almost a million parts a week. Goerlich's Inc., Toledo, uses a material-handling box and an open-type box stand with built-in hopper to do the job. It operates like this: A fork truck lowers the box (Powell Pressed Steel Company, Hubbard, Ohio) into position on the stand. A door in the box automatically opens and the material flows into a hopper on the work bench. The door closes as the box is lifted from the stand. When not in use for delivery purposes, the box can be used for warehouse storage. Offset channel legs allow easy pick-up by fork truck.

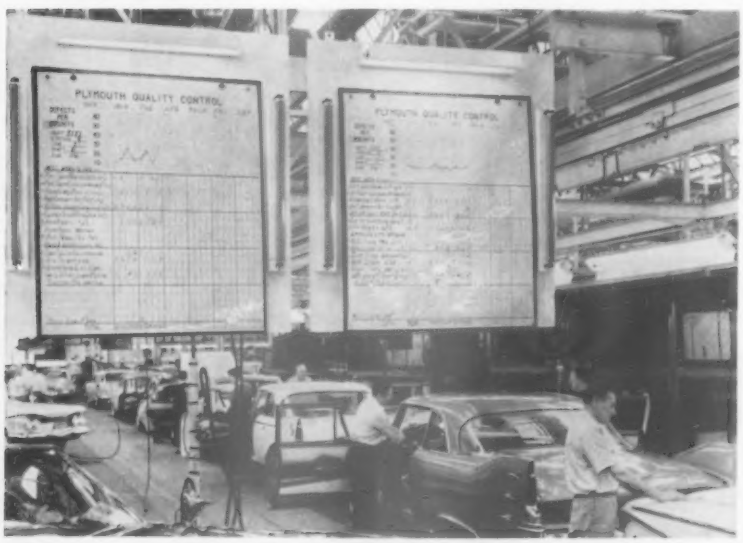
Measuring by TV Cuts Gaging Time

A TV viewer with cross hairs has cut inspection gaging time in half in many instances at Convair Division of General Dynamics Corporation (San Diego, Calif.). The device allows engineers to measure distance in two axes up to 8x4 feet without moving the part.

The basic structure is a converted lofting table, equipped with close-tolerance checking scales. The part to be examined is placed on the bed. A lens capable of magnifying parts approximately 15 times is positioned over the part. The operator checks a closed circuit television monitor to find exactly where to start and end his measurement.

Convair's former system limited it to a single axis checking procedure such as a height gage on a surface plate.

The principle of this unit can be expanded into automatic inspection methods to cope with any future increase in production.



Charts Tattle on Assembly Goof-Offs

It doesn't take long for assembly-line workers at Chrysler Corporation's Plymouth Division (Detroit) to get the word if their work is on the sloppy side. The twin quality control charts you see above quickly tell the story. They're placed in full view of all employees at 26 different locations throughout the assembly area—one chart for each shift.

The charts are updated every other hour by the quality control department, based on a random sampling of 20 cars. This sampling is taken four times per shift.

Another part of the company's quality control program is its "buy off" system. There are 17 separate inspection check points, of which five are considered master stations. Inspectors at these 17 stations check the entire car as it's assembled to that point. If it's rejected, the car is sent to a special re-work line. If accepted, it continues down the regular assembly line.

The final master station is right at the end of the special conditioning line, where necessary correction work is done.

Pegboard Brackets Hit at Costs

A universal base with movable holding brackets is saving more than $10,000 a year in tool-fixture costs at General Electric Company's Syracuse plant. Using the pegboard principle, the new base can be applied to tubing assemblies needed in making radio and television broadcast equipment.

With the quick-change fasteners, set-up men can attach general-purpose holding brackets to the base in a matter of minutes. These conform to the curvatures of any tubing assemblies (background). Formerly, G-E used hard-to-handle fixtures with welded holding brackets (foreground).

The new base is in almost constant use, so requires little or no storage. When different assemblies are needed, the holding brackets are removed from the base. Then they are indexed and stored in a shoe-box size bin. With the old system, handlers had to lug a fixture weighing over 100 pounds from storeroom to assembly floor.

The new steel base contains 3/16-in. peg holes spaced one inch apart. The base is gridded by letters and numbers, similar to a road map. When an assembly is completed, the brackets are removed and coded to locate correct storage positions.

This system might be helpful in any job shop operation engaged in small-lot complex tubing assembly.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

CREEK AT NORMAL WATER LEVEL

CREEK APPROACHING FLOOD LEVEL

Spend $1 to Save $5 On Flood Control

Nobody touches the panic button at Stokes Molded Products (Division of Electric Storage Battery Company, Trenton, N. J.) when flood waters of the Assunpink Creek start to rise. An eight-step flood control program —ready at a moment's notice—cuts downtime and eliminates the fear emergencies create when no counter measures are planned.

Steps follow in sequence and are easily reversed as danger subsides. There's another advantage: Execution costs rise only in proportion to the water level. To carry through the eight steps—then reverse the operation back to normal—costs under $1000 for labor. This outlay compares with an approximate $5000 loss caused by minor floods or with as much as $50,000 out-of-pocket expenses for major floods.

The 425x850-ft. plant is protected from the creek by a retaining wall 27.12 feet above normal water level of 73.47 feet. The highest point of water rise on record was 84.83 feet on Sept. 22, 1938, following a 2.67-in. rainfall. The flood plan was initiated on Feb. 4, 1958, with only four steps. It evolved to its present eight steps on May 26, 1958. Here's a step-by-step breakdown of the program:

1. When water level rises to 78 feet, the water in the pump pit reaches an alarm float. A signal then sounds in the boiler room and outside the guardhouse. Action: Check operation of flood pump, close flood gates, close drain inlet in alley, sandbag open section of wall around fire pump.

2. At 79 feet, the water reaches wall-drain level. Action: Install plug-drains in creek wall and shower room wall. Position gasoline pumps in low areas—such as elevator pit—where water is liable to accumulate. Discharge into creek.

3. At 80 feet, water threatens boiler room and alley area. Action: Install plank barrier. Sandbag sides of planking, unloading area, other areas in danger.

4. At 80.5 feet, water level is near boiler-room creek-water pit level. Action: Sandbag trenches leading out of pit at boiler-room floor level. Start pump to keep water down in creek-water pit.

5. At 81 feet, street water level threatens to flood alley. Action: Sandbag gate area.

6. At 81 feet, water has risen over 1 foot in pump pit. Action: Check operation of pit pump. Start standby gasoline pump to supplement pit pump.

Up to this point, measures to control flooding have been taken in low gear, but when water rises to within 1 foot of top of wall the crash program shifts into high.

7. Water rises to within 1 foot of top of wall. Action: Sandbag top of wall. Disconnect motors in mill room. De-energize calender control panel.

8. Water continues to rise to within 3 inches of top of wall. Action: Raise motors in mill room.

To execute Steps 1 to 6 takes a total of 2 hours and 40 minutes with the assistance of a watchman, a fireman, a millwright, two pipefitters, four laborers. The final two steps take a total of 3 hours and 50 minutes, with the added help of two carpenters, three electricians, and five more millwrights.

If the emergency occurs when the plant is not operating, a watchman initiates the measure outlined in Step 1. He then notifies management and maintenance personnel.

Pocket Paging Keeps Men in Touch

Seventy men are never further away from their offices than their vest pockets at Ford Motor Company's River Rouge, Mich., plant. That's where they keep their pocket receivers through which they're paged anywhere in the sprawling plant.

The system (Stromberg-Carlson, Division of General Dynamics Corporation, Rochester, N. Y.) is one of the biggest in industry with an average of 90 calls per day. Ford originally used it only to speed assembly-line maintenance trouble calls, but it has now spread to other departments within the plant.

Four separate 5-watt transmitters are used to cover the plant for paging purposes. Ford's central and division offices in Dearborn, Mich., also have transmitters on a common frequency with the plant—an unusual feature. It means plant supervisors can be paged during trips to either of the two offices, and office personnel can be reached quickly during trips to the plant.

Broadcasts are routed through a special operator who dials a 3-digit code number. This activates the paged party's receiver, which emits a beep tone. Most receivers also have an amber flash light bulb at the top—to alert personnel who are in a high noise level area.

Ford's system, unlike most, does not call for continuous paging until the party answers. Signals are repeated periodically—this jogs the memory of any preoccupied executive who shuts off the beep without taking action.

Because of the plant's vast layout (1200 acres) men paged don't report to the switchboard for calls. Instead they return to their offices or some predetermined point.

Source: Henry P. Treis, Rouge Communications Supervisor, Ford Motor Company, Dearborn, Mich.

Rollers Simplify Battery Handling

This handy cart, equipped with twin roller-conveyor sections, is making short work out of installing and removing batteries from electrical trucks at the San Jose (Calif.) plant of International Business Machines Corporation.

The deck of the cart is exactly the same height as the battery compartment of the truck. This means the battery can be moved from one to the other—via the rollers—without lifting. Steel railing around the edges of the cart prevents the batteries from rolling too far.

The cart also doubles as a workstand for maintenance and repair work on batteries.

Learning the Law

When Republic Steel Corporation, Cleveland, discovered in a survey that more than half of its employees did not know how federal laws were passed, it decided to do something about it.

The company developed its own course, hiring 14 political scientists to prepare lectures on assigned topics. These lectures were filmed, and are now being shown to more than 2350 workers in six Ohio cities, Chicago, Buffalo, and Gadsden, Ala. The course is non-partisan; political figures from both parties accepted invitations to send observers to each Cleveland session.

Republic feels the course will help participants to act intelligently on political and economic issues affecting their job security and the company's business prospects.

Maintenance List Fights Corrosion

To combat corrosion and keep plating operations at top efficiency, Canadian General Electric Company (Barrie, Ont.) has adopted a three-phase checklist. This gives workers instructions at a glance on weekly, monthly, and yearly maintenance and safety practices in the plating room. Here are examples:

Weekly Program

1. Examine all hose connections, valves, pumps, and piping for evidence of leaks. Watch for stalactites of salts—they may be the clue to slow leaks.
2. Chip off encrustations from tank edge and sides. Wire-brush contact areas of cathode bars.
3. Zero the pointers of all voltmeters and ammeters.
4. Check draincocks on tank bottoms for signs of corrosion.

5. Examine and replace poorly functioning spray heads.

6. Check timing mechanisms of automatic plating machines with a stop watch.

7. Keep a sharp eye out for any cracks in crockery.

8. Keep glass chemical containers away from aisles used by material-handling trucks.

9. Don't store or use acids near cyanides.

10. Make sure eye-washers work and that cabinets containing antidotes are fully stocked.

11. Examine fire-fighting equipment regularly.

12. In dangerous areas, such as those near chrome-plating machines, see that all hydrogen-borne mist is carried into exhaust systems.

Monthly Program

1. Remove lime from steam coils.

2. Replace corroded pipe fittings, splash guards, and drip pans.

3. Examine the inside of exhaust systems for encrustations. And replace corroded hoods and ducts.

4. Check tubes in electronic timers, regulators, and liquid level controls and warning systems.

5. Note general conditions of pumps, filters, water softeners, etc.

6. Replace swollen, broken, or worn wooden duckboards.

7. Check plumbing work, supporting steel, pumps, and the like for evidence of current leakage, or bi-polar effects.

8. Wire-brush all areas where protective paint is the sole protection against rapid corrosion.

Yearly Program

1. Disassemble all bus systems above and near the tanks. Clean and replace parts if necessary.

2. Overhaul pumps, filters, water softeners, heat exchangers, and exhaust fans.

3. Scrub down and carefully examine insides of all tanks for signs of deterioration.

4. Schedule complete overhaul of all electronic and electronic-mechanical controls.

5. Scrape anode bars clean, and wire-brush to brighten metal.

6. Clean out and replace deteriorated hoods and exhaust ducts.

Source: Peter Noy, Planning Engineer, Canadian General Electric Company, Barrie, Ont.

Big Sound Speeds Communication

A mammoth integrated sound system aids plant communications at Hughes Aircraft Company, El Segundo, Calif. More than 280 speakers are placed in factory and office buildings, cafeteria, parking lots, and dock areas. Sound levels can be individually adjusted to meet the needs of any location.

The system (Dictograph Products, Inc., New York City) transmits music, fire alarms, time signals, voice paging, taped announcements.

Control panels and transmitters are in the switchboard room, security headquarters, and fire stations. These controls indicate which speakers are in use, which department is using the system and can monitor what is being transmitted in each area.

All transmissions have an automatic order of priority. For example, security messages are given first call over all broadcasts. When the security microphone is turned on, all other transmissions are automatically silenced.

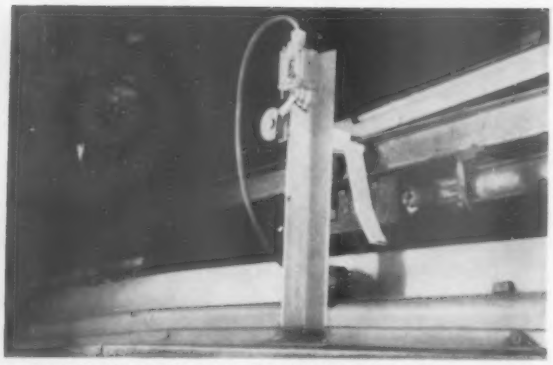
The security control panel is directly tied in with a civil defense sub-station several miles away. This means any air-raid alert signal originating at the sub-station can be transmitted over the plant-wide sound system at the discretion of the security police. At the same time, local instruction can be superimposed over the entire sound system or to selected areas or combination of areas.

The system automatically transmits time and break signals throughout the plant by means of a master clock. The system has never been turned off since its installation in July 1959.

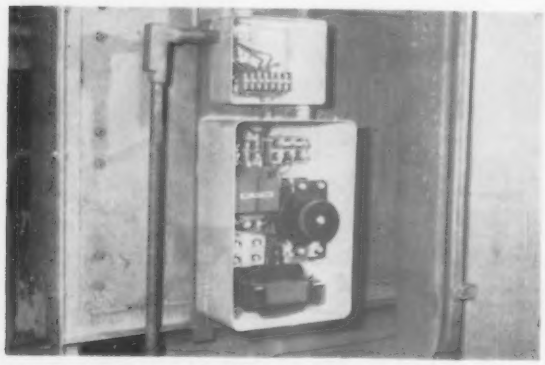
CHECKING BLOWER SYSTEM AT A GLANCE

Just a glance at this board will give control engineers at Pratt, Read & Company, Ivoryton, Conn., instant information on the operating condition of the plant's blower system. The complex system carries wood dust through a long series of ducts. Miniaturized replicas of blower equipment light up like a Christmas tree on the board when the part is functioning correctly. Darkness means something's wrong. To check the system by a hit-and-miss method would be a time-consuming job.

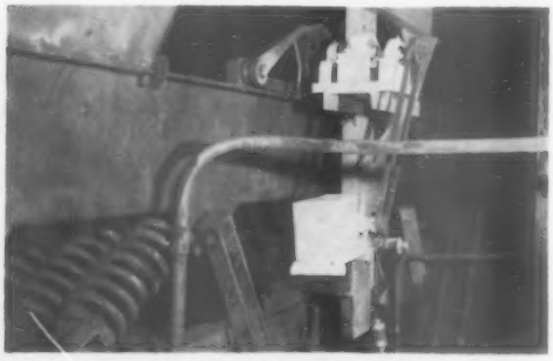
1. THESE DOORS KEEP SAND OUT.



2. SWITCHES ARE OUT OF HARM'S WAY.



3. CONTROL DEVICE ENDS HAZARD.



4. DETECTOR CHECKS VIBRATION LEVEL.

Four Ways to Keep Bugs Out of Assembly Lines

Troubles on the highly mechanized engine-block line at G.M.C.'s Pontiac Division were playing havoc with costs and production. A number of annoying mechanical and electrical difficulties brought on by abrasion, corrosion, and mechanical misuse held peak production down to 125 blocks per hour.

Going through the system with a fine-tooth comb, company engineers found the causes and suggested cures. Many relatively simple and inexpensive improvements have helped production skyrocket to 220 units an hour. That's a 76% improvement. And scrap is now only 0.2%. Here are four examples of improvements:

1. Gasketed doors on motor control cubicles helped lick the problem of sand seeping in and fouling contacts. The cabinet is also pressurized at approximately 2 to 4 psi. through a small line from the foundry air supply. Air feeds through a regulator and moisture trap.

2. Moving limit switches out of the line of fire has cut repair costs. Formerly, flasks moving through the molding and shakeout areas would frequently shift, smashing into switches and breaking them off. Switches now are mounted in well-protected positions. They're activated by cams driven by free-swinging actuators. A further improvement in limit-switch life was made by using steel bushings and chrome-plated shafts. Result: Abrasive ducts no longer send bushings to the scrap barrel after only a short life on the line.

3. Hazardous high-resistance contacts were eliminated with a Peaker—a new development in control devices (Allen Bradley Company, Milwaukee). The unit is completely static, requires practically no energy. It sends a short-duration high-voltage surge through the control circuitry. Because the surge is of such short duration it presents no accident hazard above that normal to the 110-volt control circuit voltage.

Peak surge potential is below insulation breakdown voltage. But it's still well above the level that's needed to break down contact surface and air gap resistance in the relays, contactors, and other parts of the circuit.

The Peaker can also be the answer to control circuits plagued with dust and corrosive fumes.

4. A vibration sensitive cutoff now stops sand from piling up on the conveyor. The shaker drive would sometimes fail to provide adequate thrust to properly vibrate the shaker. (Yet the drive motor continued to run at full speed.) When this happened sand accumulated on the conveyors, which meant the whole line had to be shut down.

A plant-made non-vibration detector solves the problem in this manner: A dog on the shaker engages teeth in a ratchet wheel driving a shaft. When the operation is normal the shaft turns at about 60 rpm., activating a zero switch. This switch is preset to open and stop the line whenever vibration slows to the danger point.

Source: Norris Luther, Assistant Plant Engineer, Pontiac Division, General Motors Corporation, Pontiac, Mich.

Module Ovens Bake Without Glare

Three modular-type infra-red ovens have solved the problem of firmly cementing floor covering to metal panels at Plymouth Division's Detroit plant. Before this, cement was applied to both floor and covering. The two were then pressed together by hand and transported on a belt through an infra-red lamp oven. But glare from the oven was annoying. And expensive ventilation was needed to control heat build-up.

Plymouth's new oven was assembled from 1x2-ft. quartz-faced modules (Infra-Red Systems, Pompton Lakes, N. J.) into three 3x8-ft. units mounted over the top of the conveyor belt on adjustable legs. The modules have built-in reflectors, and power turns off when the conveyor belt is not in use. Because the modules radiate extremely long infra-red rays, there is practically no visible radiation.

The 20-kw., 440-volt oven has been in operation for several months and maintains a 150-deg. temperature. An added bonus is that Plymouth can easily disassemble the oven components when they're no longer needed. They can be stored and rebuilt for another job.

Source: R. W. Cottrell, Area Engineer, Plymouth Division, Chrysler Corporation, Detroit.

Feeds by Vibration

This small vibratory feeder can feed the right amount of additive to rock salt at Morton Salt Company's Detroit plant. The unit works automatically in conjunction with the conveyor belt. And the rate of feed is preset.

Before the installation of the feeder (Eriez Manufacturing Company, Erie, Pa.) an operator had to add the material manually.

Mock-Up Makes Training Realistic

What is normal effort and what is a fair day's labor? The success of any time-study program depends on the correct answer to both these questions. Wrong calculations can lead either to labor-management discontent or to featherbedding.

To guard against this, James Manufacturing Company is training its time-study engineers in rating under simulated operating conditions. It uses mock-up equipment. For example, a wooden two-station die was designed and constructed, based on a punch press in the shop. Model is complete with back gages, electric switches, and sheet-metal blanks of two sizes. Using a predetermined time-standard system, standards on two of a possible 40-50 operations were set on the die.

At rating sessions, three mornings a week, 10 cycles of various pieces are demonstrated at different speeds. The trainees rate each cycle. Their ratings are then compared with the actual rating based on the predetermined time study.

Students are kept on their toes by having their scores posted on graphs. And competitions are held over specified periods, the winner for each being the man with the lowest number of errors.

In order to avoid labor misunderstandings, union officials have been sent invitations to participate in the course.

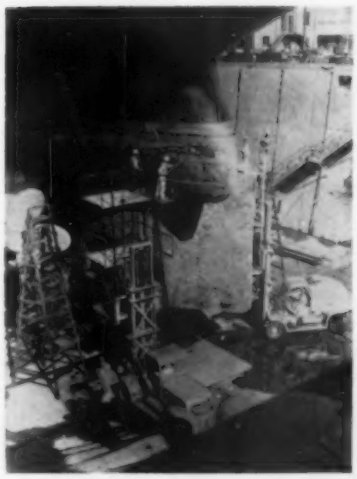
This method enables the company to give its engineers realistic training without having to disrupt shop procedure or take machines out of operation.

Source: Peter Bateman, Supervisor of Industrial Engineering, James Manufacturing Company, Fort Atkinson, Wis.

Yellow Flags Danger

There's no mistaking accident hazards at United States Gypsum Company's South Gate, Ill., plant. They're clearly marked.

Whenever an unsafe condition is spotted, maintenance personnel use a bright yellow flag, a miniature flag pole, and an information tag to provide visual warning. These are prominently attached to the specified machine by a magnet, which is also painted yellow. The colorful signal must remain until the hazard has been removed.



Fork Trucks Double as Scaffold Bases

Fork trucks equipped with homemade scaffolds are reducing costs and saving time at Newport News (Va.) Shipbuilding and Dry Dock Company.

Under the old method railroad cranes were used to lift crews to their work areas. But this tied up much-needed crane facilities for too long a period.

The two fork trucks (Clark Equipment Company, Battle Creek, Mich.) now used have a 20,000-lb. capacity and a 25-ft. lift. The 16-ft.-high scaffold on each truck consists of two expanded metal floors, enclosed by guard rails. This gives a total lift of 41 feet. Ladders permit riggers to move between the two platform levels. The trucks move the scaffolds to wherever they're needed alongside the vessels.

YOU BE THE ARBITRATOR

THE CASE OF

The Unwanted Job

Out of the experience of the American Arbitration Association

A shoe manufacturing company in New Hampshire leased one of its buildings, which had been vacant and unattended, to a leather findings corporation. The corporation agreed to buy leather scraps from the footwear company; otherwise it was a landlord-tenant relationship between two independent firms. The arrangement led to a change in work assignments for watchmen.

The union objected to the new set-up because the watchmen now had additional duties patrolling the inside of the leased building. Up to this time all their work had been in the shoe factory.

"That isn't fair," the men complained. "The findings company is an independent outfit. We're not on their payroll. Why should we have to do work for them?"

"You have nothing to complain about," said the plant manager. "We shortened your patrol around the shoe plant to compensate for your new duties at the findings company building. I can't see how it makes any difference to you."

The union admitted that the watchmen didn't actually have more work to do, but it was a matter of principle. So the dispute went to arbitration under the rules of the American Arbitration Association. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 198

Glass Filter Bag Keeps Air Clean

Huge glass filter bags proved the answer to air pollution at Hudson Bay Mining and Smelting Company, Ltd., Flin Flon, Manitoba. The clean stack in the photo is the evidence. The oscillation bags in the compartments (left) do the job.

The high cost of cooling tubes and other devices the company needed for filtration had made this bag-type dust collection economically prohibitive. Gas temperatures were over 800 F. The maximum temperature that could be used with these filters was 250 F.

The gas temperature only has to be reduced to 450 F. for filtration by the glass bags (Dracco Division, Cleveland). This is 150 F. less than the maximum advisable temperature for this filter. The primary cost of equipment to cool gasses to this temperature was just half what it would have been to reduce the temperature to 250 F.

Lifting Fork Trucks for Maintenance

A monorail and set of chain blocks, normally used for lifting engines, have solved the knotty problem of fork truck maintenance at Columbia Cellulose Company's Prince Rupert, B.C., plant.

Maintenance crews had trouble reaching the undersides of these vehicles under safe conditions. A special ramp over the grease pit would not do the trick. Different spacings of the front and rear wheels of the fork trucks, and the limited opening between the sides of such a ramp ruled this out.

With the new method, the rear of the truck is first lifted by chain blocks. The operator backs the truck over the grease pit with the front drive wheels. The projecting rim of the grease pit acts as a safety stop. The rear of the truck is then lowered until the counterweight rests on the opposite side of the pit. This makes the entire underside of the truck accessible for maintenance.

With some truck models, lowering the counterweight to the edge of the pit levers the front wheels off the floor. This action permits ready removal of the drive components for overhaul.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

Paint Drums Are Sent to Pasture

A streamlined paint handling system has replaced the transitional metal drum at Eastern Products Corporation's Baltimore, Md., plant.

It works like this: Two specially constructed 6000-gal. tank cars shuttle between the vendor (E. I. duPont de Nemours & Company, Philadelphia) and the plant. They act as a sort of moving pipeline, keeping four underground storage points at Eastern Products constantly filled with paint.

The paint is transferred from tank cars to the reservoir in just a few minutes. From that point the entire operation is handled by remote control from a central board. The paint is sent to mixing machines, then to various stations throughout the multi-building plant via underground pipelines.

This method contrasts sharply with the old system of receiving paint in drums, unloading it manually, and then transporting it by truck or cart to the mixing room. The drums had to be opened, emptied, and finally shipped back to the manufacturer.

Though the initial outlay for the streamlined system was high, it is paying long-range dividends in reduced freight and handling costs. It has also cut handling time and improved over-all control.

Speeds Gaging

Time needed to gage plastic radomes at Brunswick-Balke-Collender Company (Marion, Va.) has been cut from days to hours.

Formerly, separate checking fixtures had to be built for each different component. Parts were frequently measured, reshaped, and replaced on the fixture.

Now thickness is read directly on the calibrated scale of a Vidigage ultrasonic resonance gage (Branson Instruments, Inc., Stamford, Conn.). This is done without removing the part from its mandrel or mold. With this method a two-man team can measure the 4000-plus check points of a B-58 nose radome in less than a day.

It works like this: A continuously varying frequency, produced by an electronic sweep oscillator, is changed into mechanical vibrations by the transducer and transmitted into the plastic. At certain frequencies—characteristic of type and thickness of material under test—harmonic resonances are set up. These appear as one or more traces on the cathode ray tube (similar to that used in a television set). By placing suitably calibrated scales in front of the tube, thickness can be read directly.

Ferris Wheel Packing

This plant-made ferris wheel tilting device simplifies packing of consoles at Webcor, Inc., Chicago.

The packing case used to be placed on a table with the flaps opened. Two men had to lift the console into the case. This effort was eliminated by building a ferris wheel and mounting it so it rotates on four ball-bearing wheels. Feeder conveyors are attached on each side of the ferris wheel.

One man can now fit the case over the console, which comes upside-down on the conveyor. Case is pushed onto the wheel and rotated 180 degrees. Operator then slides it out the other end and console is upright, ready for sealing.

Webcor plans to motorize the wheel for added speed.

CASE BOOK CAPSULES

Vinyl plastic weatherstrip specifications have been proposed by the U. S. Department of Commerce. The standards would establish three grades of the material according to hardness values.

A world safety record for the steel industry was set when U. S. Steel Corp.'s Lorain (Ohio) plant completed 10-million man-hours without one disabling accident among its 10,500 employees.

A test procedure for catching flaws in honeycomb materials used in space age missiles has been developed by Magnaflux Corp., Los Angeles. The non-destructive system can detect too much or too little braze, deformed core, and other defects in these materials.

Tomorrow's electronic equipment will use a miniature electron tube, requiring only about one-twentieth the power of conventional tubes, according to Radio Corp. of America, New York. The tubes will have a life expectancy of hundreds of thousands of hours.

A silicon transistor that switches 200-million times faster than you can blink your eye has been developed by Raytheon Co., Needham Heights, Mass.

Time can be magnified 100,000 times with a newly developed ultra-speed camera (Benson-Lehner Corp., Santa Monica, Calif.). It's designed to give industry a tool that can freeze ultra-fast motion. With it, the events of one second, projected at standard rate, could be stretched to 28 hours.

An automatic digital control system designed to position the rolls of a hot strip mill to give the desired thickness of steel has been built by Datex Corp., Monrovia, Calif.

All-aluminum pre-fabricated service stations that can be put up in two to four days are being made by Reynolds Metals Co., Richmond, Va. Advantages: Low maintenance and easy portability.

Vibrations Signal Bearing Failure

Bearing failures are instantly pinpointed during high-speed endurance tests at Hyatt Bearing Division, Harrison, N. Y. And there's no need for full-time attention by plant personnel. A vibration-sensitive device combined with a recording potentiometer does the job.

Changes in sound emitted from test apparatus used to be the only warning that bearings were going bad. Tests were on an around-the-clock basis. There was no way to determine when a failure after working hours occurred.

Now a vibration malfunction detector (Robertshaw-Fulton Controls Company, Anaheim, Calif.) is mounted directly on the test apparatus. This device can be set for varying degrees of sensitivity by a calibrated dial and set screw. When the vibration level reaches the required point, the Vibraswitch automatically shuts down the testing machine.

A recording potentiometer (Leeds & Northrup Company, Philadelphia) checks the machine's temperature at all times. If the test is stopped at night or when no one is present, the lab worker can determine when the machine was shut off by studying the temperature chart.

The detector can be used by plants with reciprocating, rotating, or oscillating machinery—pumps, compressors, fans, blowers, and centrifuges.

Dumper Cuts Down on Space and Costs

Substantial savings in both handling and material costs are being realized by the Chicago plant of Lever Brothers Company through the use of this dumper.

Phosphate was formerly received in 60-lb. paper bags. Today it's delivered in 1½-ton expendable corrugated containers. This takes considerably less warehouse space.

Here's the system: Wood slats are glued to the container bottom and transported by fork truck to the dumper (Uhrden, Inc., Dennison, Ohio). The cradle of the dumper has a semi-circular shape conforming to the container. The overhead bar prevents the ejection of the container during inversion. The hood covers the bin into which the contents are dumped. Collection ducts in the hood take care of the dust problem. The pushbutton controls for the dumper are placed above the motor (right of photo).

Payoff: The dumper paid for itself during the first year of use.

Course Improves Driving Techniques

A cowboy behind the controls of an industrial truck can be just as big a menace as careless drivers on the open highway.

Realizing this, Norton Company, Worcester, Mass., has developed a training and licensing program designed to improve the driving habits of all its operators.

Each department utilizing mobile equipment submits a list of operators to participate in the two-phase training program.

First phase of the program consists of a lecture, safety movie, and the reading of various safety pamphlets put out by industrial truck manufacturers. The company also issues each operator a handbook summarizing important operating procedures. An instructor briefs the men on what they should look for in the film. After the showing he leads them in a give-and-take discussion on the various points brought out in the movie.

Second phase is an actual driving test through a tough obstacle course. The course is laid out in an outdoor paved area with wooden pallets to outline simulated aisles and passageways. Each operator is required to drive his vehicle through a 50-ft. straight course, between pallets placed 4 feet apart. Next he drives it through a serpentine course, both forward and backward. Finally, he has to drive a loaded truck down a simulated aisle, placing his load in an area at right angles to the aisle.

Company inspectors check each operator on specific points throughout the course, pointing out his errors and bad driving habits on the spot. Even old-timers find the course a stiff test of their ability—some of them discovered they have developed undesirable driving habits over the years.

Finally, the trainee-drivers are required to pass a written test on what they have been taught.

On successful completion of both phases of the course, drivers are issued license buttons on which their photographs appear. A supervisor may designate new men as trainees if additional drivers are needed. Buttons bearing the word trainee are issued to these. No others are allowed to operate the trucks.

1. Pushbutton skid storage

2. Transformer out of way

3. Rivets speed up assembly

Simple Tricks Save Time and Storage

Giving your own plant the once-over every now and then can really pay off. Though your over-all operation may be highly efficient and productive, small changes might make it even more profitable.

This was true at REF Manufacturing Corporation, Mineola, N. Y., where relatively simple improvements led to savings in critical storage space and production time. Here are three examples:

1. This pushbutton grip (photo) has a double payoff. It simplifies material handling and is the key to an efficient metal sheet storage system.

Excessive operating and storage costs caused the company to scrap its vertical bin system in favor of skids serviced by an overhead crane. With the former system, sheets were hand-carried to the shear individually after removal from a bin. Now they are stored on skids according to gage. When a sheet is needed, the operator centers the overhead crane above the stack, lowers the grab, and tightens the grippers under the skid. He leaves the bottom skid at the shear, returning those above it to the storage area. The crane has a capacity of 5 tons.

Skid storage protects the sheets against bends and scratches. It also permits more sheets to be stored in the same area. This, in turn, allows REF to order metal in economical large quantities.

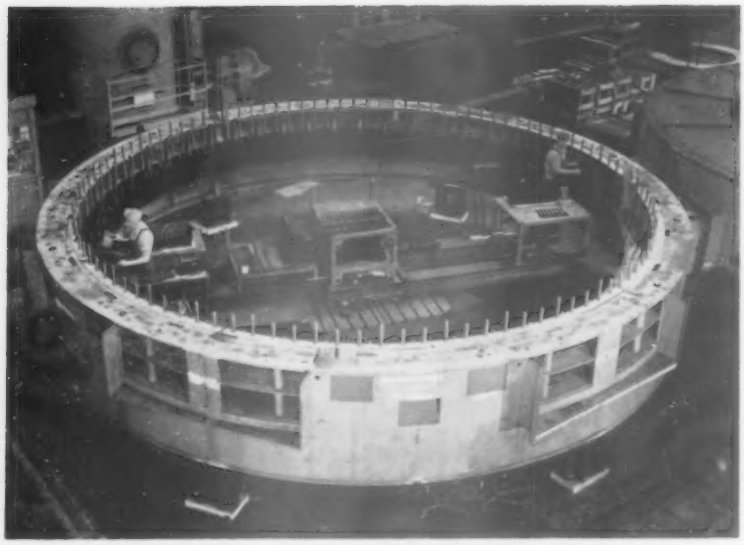
2. Wallflower transformers (photo) at REF take up no valuable production area space. Three 25-kw. transformers are mounted on the wall right over the spot welder they serve. This reduces line-voltage losses and increases efficiency.

The only protection necessary is a heavy screen to guard plant personnel against high voltage. Much more elaborate shielding would have been needed with floor-mounted transformers. They would also have required 25 square feet of precious floor space.

3. Clamps instead of make-up screws are now holding parts together for riveting (photo). The make-up screws were used as temporary fasteners, but they required a lot of time to insert and remove, held up production. C-clamps also proved unsatisfactory—they were cumbersome and permitted parts to shift. This necessitated frequent realignment of the holes.

The riveting clamps, however, can be installed quickly with a pair of pliers. The operator merely squeezes the clamp and inserts it into the hole. As he releases it, a shoe-like projection springs out to fasten the sheets firmly. He removes the clamp with a squeeze and pull of the pliers.

The clamps have slashed assembly time at REF. And they can be re-used several hundred times.



STACKING PUNCHINGS AS THEY RIDE

This rotating supply bench is proving quite a cost- and labor-saver at the West Allis, Wis., plant of Allis-Chalmers Manufacturing Company. It's being used to stack stator punchings. The motorized table can be adjusted to accommodate stators of different diameters. It has convenient platforms for stackers and a supply of laminations at each end. Stackers ride the table around the inside of the stator, placing laminations over the stator dovetails. Controls to start and stop the rotation are right on the table at the operator's fingertips. Before installation of the bench, stackers had to walk back and forth inside the stator area.

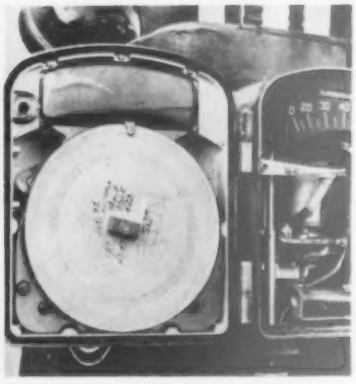


Chart Measures Lift-Truck Action

A device that measures fork-truck performance is making a success of a direct incentive plan for drivers at Tube Turns Division, Chemetron Corporation (Louisville, Ky.).

Key to the whole incentives system is the Truck-O-Meter, a recording device that measures and charts both travel and lifts. Travel is recorded in feet, lifts are recorded whenever a load in excess of the weight of a standard pallet and divider is raised. Both are recorded by styluses on a circular chart.

This chart (photo) gives the record of 3½ hours of activity for one operator. The information in the center identifies operator, area, shift, and vehicle. It records that he has traveled 40,000 feet and made 303 pick-ups.

Here's how measuring is done: At the outside edge of the chart are six circles. Every time a truck runs 2500 feet, the stylus line moves five spaces. That means every peak represents 5000 feet of travel. Since there are eight peaks, this equals 40,000 feet.

Lifts are measured by the lines on the inside circle. Each lift is shown as a movement from inside to outside in the chart. The line remains toward the outer edge from the time the load is lifted until it is put down. Thus, periods of rest, duration of carry, and the number of carries can be analyzed in relation to truck movement.

The device is being marketed by Institute of Modern Management, Louisville, Ky.

Five Steps to Better Supervisory Training

A five-phase program for supervisory training is paying heavy dividends in employee performance at Temco Aircraft Company, Dallas. The instruction system was instituted by the company after a series of tests pinpointed specific training needs. The tests covered 87 factors and were given to supervisors at all levels.

The program is voluntary on some levels, mandatory on others. Some instruction is on company time, some on employee time. The five steps it covers are:

1. Pre-supervisory training is the first phase. It begins long before an employee is even considered for a supervisory position. Students are recruited in two ways: Supervisors can recommend workers or any employee can volunteer providing he meets current standards. Despite the fact that courses are given on employee time, over 1500 workers have applied in a three-year period. One third of these were accepted. Instruction is both on technical and managerial subjects. These include math, blueprint reading, practical English and command of words, and methods improvement.

2. Basic technical qualifications needed in any Temco supervisor are covered in this session. Taught on company time, instruction is varied to fit the needs of the individual. Typical subjects include trigonometry, assembly, measuring instruments, and sketching. To pass the test, a student must have a grade of 75% or higher.

3. Familiarizing newly promoted supervisors with the duties of their jobs is next on the agenda. Courses are given in six consecutive eight-hour sessions on company time. Subjects include: foreman-team concept, human relations, and fundamentals of management.

4. Manufacturing supervisors are the target here. This phase is divided into two sections. Group A instruction is given to all first-line supervisors and Group B to modification and overhaul foremen. Taught on company time, both sections consist of six full-day sessions.

5. Oral and written communications are the subject of the fifth and final session. This is designed to aid

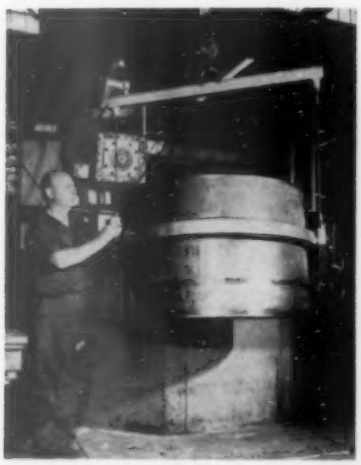
supervisors to express themselves clearly in both mediums. Courses include creative thinking, memory improvement, basic speech, and report writing. They are taught on company time.

Certificates of completion are given to all employees who pass these courses. Supervisors who are certified in phases two to four receive an automatic 6½ % increase in pay, provided they have completed two years with the company in a supervisory capacity.

Payoff: Supervisors have improved their technical and managerial skills. They have gained a broader outlook of the company in general. And have learned how their function in particular contributes to the whole operation. They have also gained a greater appreciation of the problems of other supervisors and management members.

PLASTIC SHEETS MUSCLE OUT GLASS WINDOWS

Translucent plastic sheet windows (at right) are the answer to vandal and weather damage at Pacific Pipe Company, Oakland, Calif. These lightweight sheets are a sharp contrast to the old glass and wood sash windows (left). Press-molded of acrylic-polyester resin, the new panels resist fading and discoloration from bright sun or severe weather. Their strength eliminates any possibility of damage from vibration, impact, or vandalism. The panels are tinted soft green, transmit glare-free, natural light. The glass fiber (Structoglas, Inc., Cleveland) comes in 50-in. wide sheets. This means fewer panels are needed to cover the same area.



Air-Controlled Grabs Have Gentle Touch

These pneumatically operated grabs are making quick work out of a touchy material handling job at Lycoming Division's Stratford, Conn., plant. The least concentration of stress at any point on this missile part would cause irreparable damage. This makes an ordinary grab useless for the process.

The company used to wrap and secure the section with nylon or leather and move it by crane. It was a time-consuming job.

Now the Pneuma-Grip (Presray Company, Pawling, N. Y.) does the job by the push of a button. It works by the application of an even peripheral pressure against the load. This is accomplished by using neoprene pneumatic members assembled in annular metal channel retainers, and introducing controlled air pressure into the pneumatic chamber. This expands the unsupported face of the pneumatic member equally against the load.

More Hose, Less Space

This method of storing hose reels has halved warehouse space needs at Dayton Industrial Products Company (Melrose Park, Ill.):

The reels are placed on individual axles in special bays on an A-frame rack. This permits storage in pyramid fashion on racks 10½ feet high. Handling time has been cut considerably since hose may be unreeled without removing the reel from its position in the rack.

One man with a walkie-type fork truck can stack the reels, lifting and removing units with special clamps atttached to the forks.

Since each bay can be built separately, racks may be extended for any length when constructed in warehouse areas. The A-frame design holds them up, away from walls, without any further support.

Dayton previously used angle-bar construction storage bays. The reels had to be removed when odd-order lengths were required.

COMING—MAY CASEBOOK

Read how Borg & Beck Division of Borg-Warner Corporation cuts production costs by inventing its own tools and devices instead of investing in expensive machines.

Takes the Arithmetic Out of Time Cards

The arithmetical job of determining elapsed time from job and time cards has been eliminated by Automatic Timing and Controls, Inc. (King of Prussia, Pa.).

The company used job cards for each employee. It registered the time a job began and was completed. But a clerk had to figure out by subtraction how much time was spent on a job. This was time-consuming and the possibility of human error was always present.

Today the job is done by a time computer that automatically computes and records net elapsed time (Calculagraph, Inc., Harrison, N.J.). This device has been used for some time by telephone companies to compute phone call time. If, for example, a worker starts on a job at 10 a.m. and finishes at 11:06, the Calculagraph will register 1.1 hours. It can figure in tenths of hours or in minutes.

The machine is even more useful for time cards. If a worker punches into work at 8 a.m. and punches out again at 4 p.m., the machine will not register 8 hours, but maybe 6½. It can be adjusted to take into account the one-hour lunch period and

the two 15-minute breaks. The time at which these breaks are due can also be fed into the machine. This means that if a worker comes to work at 8 a.m. and leaves sick at 12 noon, the elapsed time will read 3.75 hours. He will be charged for the morning break, but not for lunch or the afternoon break.

One clerk can now process 25% more cards in one-third the time.

AT&C also uses the Calculagraph for taking the arithmetic out of its time studies.

YOU BE THE ARBITRATOR

Continued from page 192

The award—The arbitrator said that even though patrol time was not increased, the company had no right to assign men to work on the premises of and under the supervision of another company: "To uphold the company position would be to ultimately sanction the assignment of employees to any plant owned by the other company, irrespective of its working conditions, location, or job workloads, solely on the ground that the company has contracted to supply service to another company."

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Trucks Lift Both Pallets and Drums

Fork trucks are usually used for moving pallets at Oakite Company, Brooklyn. But the trucks are also called upon to lift single drums several times a day. The vehicles are quickly and inexpensively converted to perform either task, eliminating the need for additional trucks or bolted accessories.

The company bought a drum clamping assembly and welded a frame into which the truck forks fitted. The drum attachment sits in the storage area and when the operator has to move drums he just runs his fork into the slots.

Result: a versatile fork truck capable of lifting both pallets and drums with no lost time.

Air Clutches Speed Press Operations

Use of air clutches and brakes for brick presses has boosted production 25% at Kaiser Refractories and Chemical Division's Moss Landing, Calif., plant. And almost eliminated the need for clutch maintenance.

Production of special brick requires constant starting and stopping to allow the press operator to handle the shapes. The presses used to be equipped with mechanical clutches. This meant the operator had to control both starting and stopping manually. This took time and offered no protection against accidental recycling while the operator was removing the brick. The clutches also required adjustment after 16 hours of operation and a complete overhaul twice a year.

Now air clutches (Fawick Airflex Division, Cleveland) are operated by pushbutton. Interrupting beams from photoelectric cells, mounted on the front of the press, allow simultaneous disengagement of the clutch and engagement of the brake. The automatic braking system is a safety factor.

The air clutches have no linkages, levers, or springs that require lubrication or overhaul. The rubber actuating tube automatically compensates for friction shoe wear, eliminating need for adjustment.

Manhour costs cut 51% by Budgit® Electric Hoist

Push Button Budgit Electric Hoist. Portable. For regular hoisting service where lifting speed and positive braking action are essential to keep production on the move. A 1-ton load can be lifted at 17 F.P.M. Two fully enclosed automatic brakes assure safe load control as well as accurate spotting action. Compartmented components reduce maintenance needs to the utmost in simplicity. Hook suspension. 110-220-440-550 volts AC. Only 24 volts at the push buttons on the higher voltage models for extra safety. Capacities: ⅛ to 2 tons.

Pull Cord Budgit Electric Hoist. Portable. Ideal for intermittent service. Has efficient gearing and two brakes. Provides fast lifting and one-hand operation. Available for AC, DC, and 12-volt battery operation, the latter models for truck or other use where regular electric power is unavailable. Hook suspension. Capacities: ⅛ to 2 tons.

At Kent Products, Inc., Grand Haven, Michigan, high speed presses turn out small automotive stampings in big quantities, so scrap metal removal is a constant task.

One man using a 1-ton Push Button Budgit Electric Hoist on a push-type crane does the job easily and safely. He first attaches two grabs to a scrap-filled drum. Using one hand to "thumb" the push button, the operator hoists the load. His other hand guides the drum into the trailer truck. Spotting is accurate, even in piling the drums two-high.

The old method required a fork truck and driver, plus two other men to handle the drums in the trailer. Frank W. Behm, Plant Manager, reports that the new way paid for hoist, crane assembly and accessories in a few months.

Compare the new P:B Budgit Hoist with any other electric hoist in its class. It's a portable hoist you can hang up, plug in, and use immediately with top efficiency, safety, convenience and economy. Write for Bulletin 15010-15C or ask your nearby Shaw-Box Distributor for a demonstration.

60 A-2

MANNING MAXWELL & MOORE INC. TRADE MARK

BUDGIT ELECTRIC HOISTS

A product of

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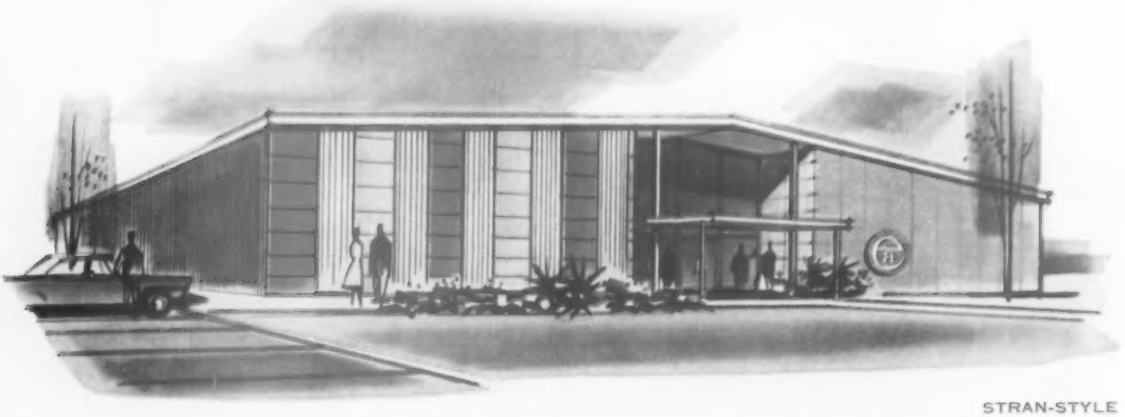
Shaw-Box Crane & Hoist Division • Muskegon, Michigan
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

the new STRAN-STYLE



STRAN-STYLE I

four custom styles by Harley Earl

STRAN-STYLE III

an original concept in commercial

Recently retired as General Motors Vice-President in charge of Styling, Harley Earl has been a leading influence in design for nearly 40 years. Latest achievement of his firm: the new Stran-Style buildings.

Harley Earl Associates, noted industrial designers, have created four graceful, horizon-hugging buildings which enhance any commercial or industrial operation . . . colorfully, functionally blending Stran-Satin color-coated steel, glass and architectural porcelain panels around the efficient spaciousness of column-free interiors.

But the most exciting aspect of Stran-Style lies in its totally new concept, unprecedented in the steel building field. Each Stran-Style building is completely pre-designed, pre-engineered, factory produced—ready for erection on your lot immediately. *Only Stran-Style buildings combine the finest of contemporary design with cost-lowering mass production economy.* Select Stran-Style I, II, III or IV for your business . . . you get a modern structure of unrivaled beauty PLUS extensive savings in time of erection, in maintenance, in total cost.

After you select your Stran-Style building, colors and size, you deal with only one source for the complete project. Your Stran-Style

pre-engineered steel buildings!

STRAN-STYLE II

...built by Stran-Steel

STRAN-STYLE IV

and industrial buildings

building—manufactured and warranted by Stran-Steel Corporation, a division of National Steel Corporation—is sold, erected, even financed by local dealers who offer a five-year purchase plan requiring as little as 25% down.

An infinite variety of color combinations can be yours. Choose from nine sparkling Stran-Satin colors—multi-layer, protective coatings of vinyl-aluminum or vinyl-base color baked on zinc-coated steel—and a wide range of colors in architectural porcelain.

For more information, mail the coupon or call the Stran-Steel dealer near you. He's listed in the Yellow Pages under *Steel Buildings* or *Buildings—Steel*.

Stran-Steel

Clip coupon and mail to STRAN-STEEL CORPORATION, DEPT. FMM-8, DETROIT 29, MICHIGAN

Please send complete literature on Stran-Style Buildings in Stran-Satin Color. I'm interested in a building approximately_____ft. by_____ft. to be used for_____

Name_____ Title_____

Company_____ Phone_____

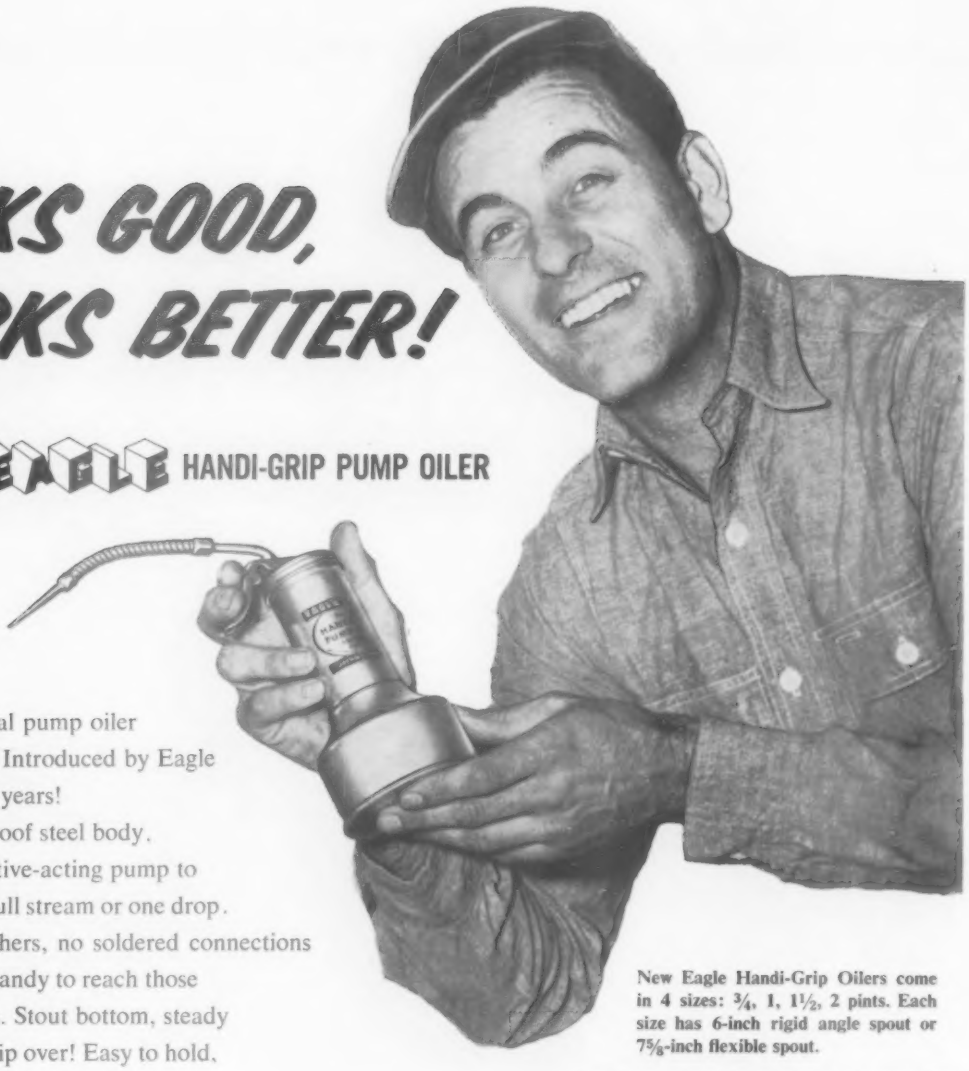
Address_____ County_____

City_____ Zone_____ State_____

STRAN-STEEL IS A DIVISION OF **NATIONAL STEEL CORPORATION**

LOOKS GOOD, WORKS BETTER!

THE NEW EAGLE HANDI-GRIP PUMP OILER



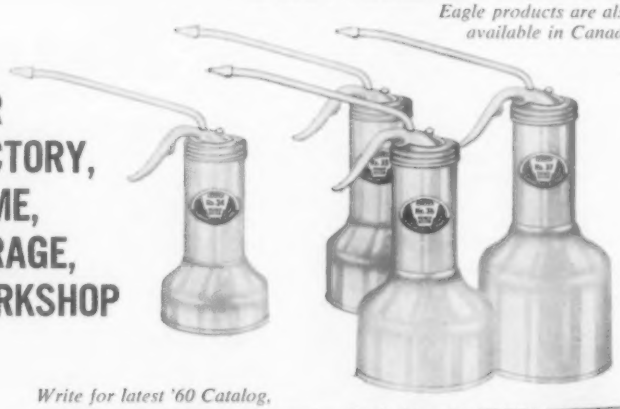
Here's the ideal pump oiler for every use! Introduced by Eagle Guaranteed 5 years! Strong, leakproof steel body. Powerful positive-acting pump to deliver oil in full stream or one drop. No pump leathers, no soldered connections to wear out. Handy to reach those difficult places. Stout bottom, steady stance, won't tip over! Easy to hold, easy to use, reasonably priced.

New Eagle Handi-Grip Oilers come in 4 sizes: ¾, 1, 1½, 2 pints. Each size has 6-inch rigid angle spout or 7⅝-inch flexible spout.

ORDER FROM YOUR SUPPLIER

Eagle products are also available in Canada

FOR FACTORY, HOME, GARAGE, WORKSHOP



Write for latest '60 Catalog, just off press, showing the Complete Eagle Line. It's **FREE!**

EAGLE MANUFACTURING CO. WELLSBURG, W. VA.

SERVING THE TRADE SINCE 1894

Bostitch shows metal fabricator how to increase production 33%—cut costs 18%—with stapling

Weather Products Corporation of Warwick, R. I., used screws or rivets to join the top and side of its Ever Seal triple-track aluminum windows.

A Bostitch Economy Man suggested stapling. Results—production rate rose by a third and manufacturing cost fell 18%. Bostitch staplers eliminated the pre-drilling needed with former method. Stapling is a split-second, single-motion job. And the staples themselves cost less than the fasteners formerly used.

"Customer reaction has been excellent," reports plant management, "and complaints of loosened and separated fasteners are completely ended."

Whatever your business, whatever you fasten—it's safe to say at least one combination of Bostitch staplers and Bostitch staples can give you better, faster fastening *and* an improved product. The 350 Bostitch Economy Men who work out of 123 U. S. and Canadian cities offer you a wealth of fastening experience. To talk with one, look under "Bostitch" in your phone book. Or mark and mail the coupon.

Fasten it better and faster with

BOSTITCH®
STAPLERS AND STAPLES

With every Bostitch machine you get... the right combination for your needs from 800 staplers and over 200 staples... nation-wide parts, service and technical aid backed by the industry's most modern factory... assurance that Bostitch products will operate to your complete satisfaction.

Bostitch, 604 Briggs Drive, East Greenwich, R. I.

Please send me free information on Bostitch staplers and staples.
I am interested in fastening

☐ corrugated board ☐ leather ☐ roofing
☐ cartons ☐ plastic ☐ rubber
☐ fabric ☐ wood ☐ light metals
☐ Other (please name)_____

I now use_____
(fastening method)

to fasten_____
(material and item)

Name_____
Company_____
Address_____
City_____ Zone___ State_____

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Methods men are sure to like new stopwatches (*Heuer*) that register minutes (up to 60) on large red circle around central shaft instead of on usual small, off-center dial. Greater capacity, better legibility. **(236)**

Stumped by the job of allocating costs of buildings, machinery, and equipment over their expected useful lives? A 23-page booklet, "The Many Sides of Depreciation" (*Dartmouth*) was written for such as you. **(237)**

Newest disposable pallet (*Union Bag-Camp Paper*) consists of sheet of double-wall corrugated board to which two half-cores of laminated kraft paperboard are attached. Cores can be centered to fit any fork truck. Pallet can be set up in 60 sec. by two men with simple jig. Weight, 8 lb. **(238)**

Air-cushioned vibratory finishing machine *(Pangborn)* means mechanical finishing for parts too fragile for present tumbling and precision finishing barrels. And it turns out work up to 100 times faster! **(239)**

Don't know all you ought to know about pumps? Our prescription: a primer *(Worthington)* of rotary and centrifugal pump theory and design that takes you back to fundamentals, has most of the answers you're looking for. **(240)**

We go for Bartenders —i.e., bar, tubing, pipe storage racks *(Cady)* with telescoping extensions that facilitate loading, unloading. **(241)**

You may go for a free-standing 12-ft.-long storage unit *(Columbia-Hallowell)* with four 3½-in.-wide support bars at each of its five horizontal levels to provide smooth, flat surfaces that won't indent lumber or other soft materials. You can add 4-ft. sections as needed. **(242)**

Pop go the rivets *(United Shoe Machinery)* in many a plant with fastening problems—metal to metal, metal to plastic, metal to rubber, metal to fabric, and many other combinations of materials. Worth looking into? **(243)**

For quick sandwich service, new machine (*Automatic Foods*) combines storage frig (room for 100) and infra-red oven in one unit. **(244)**

Vacation schedulers will want a copy of "Business Almanacke and Calendar for 1960" *(Manpower, Inc.)*. Contains not only helpful schedule, but also useful information all done up in ye authenticke olde style. **(245)**

Little powerhouse name of Tow-Mite *(Northwestern Motor)* may be just what you need to move materials in close quarters. Weighs only 750 lb., turns on 38-in. wheel radius. Average fuel cost: 60¢ for 8 hours. **(246)**

Spring being still in the offing, there is yet time to look at Orbit-Air, a rotary mower *(Food Machinery)* designed so that grass is cut at tip of 22-in. tripled-pitched blade and cuttings are guided by air currents to other cutting edges to be chopped up, finally distributed evenly as mulch. **(247)**

One-man, one-piece scaffold on wheels *(Up-Right)* unfolds in jiffy. Two V-braces snap together to form rigid X-joint that supports structure. Platform height, 1 to 8½ ft. Casters lock automatically. Legs quickly adjustable for uneven floors, stairways. Scaffold stores as 9½-in.-wide package. **(248)**

Two simplified sketches show employee-in-hurry how to smother blaze with new dry chemical extinguisher *(American LaFrance)* for B and C fires. One-hand operation. Weight, 4¾ lb. Discharge time, 10 sec. **(249)**

Methods men can save time by using pressure-sensitive tapes and templets (*Applied Graphics*) when making layouts, audio-visuals. **(250)**

Soft-hat comfort, no top-heavy feeling, is what hard-hat wearers will like about new glass-fiber, aluminum, plastic headgear *(Bausch & Lomb).* Quick, easy fitting to head sizes from 6⅝ to 8. **(251)**

Handy-dandy safety shield *(Better Specialties)* is flexible, transparent rectangle made of heavy vinyl sheeting. Either of two permanent ceramic magnets is powerful enough to hold shield vertically, horizontally, at any angle, even in a curved position, on drill presses, lathes, grinders. **(252)**

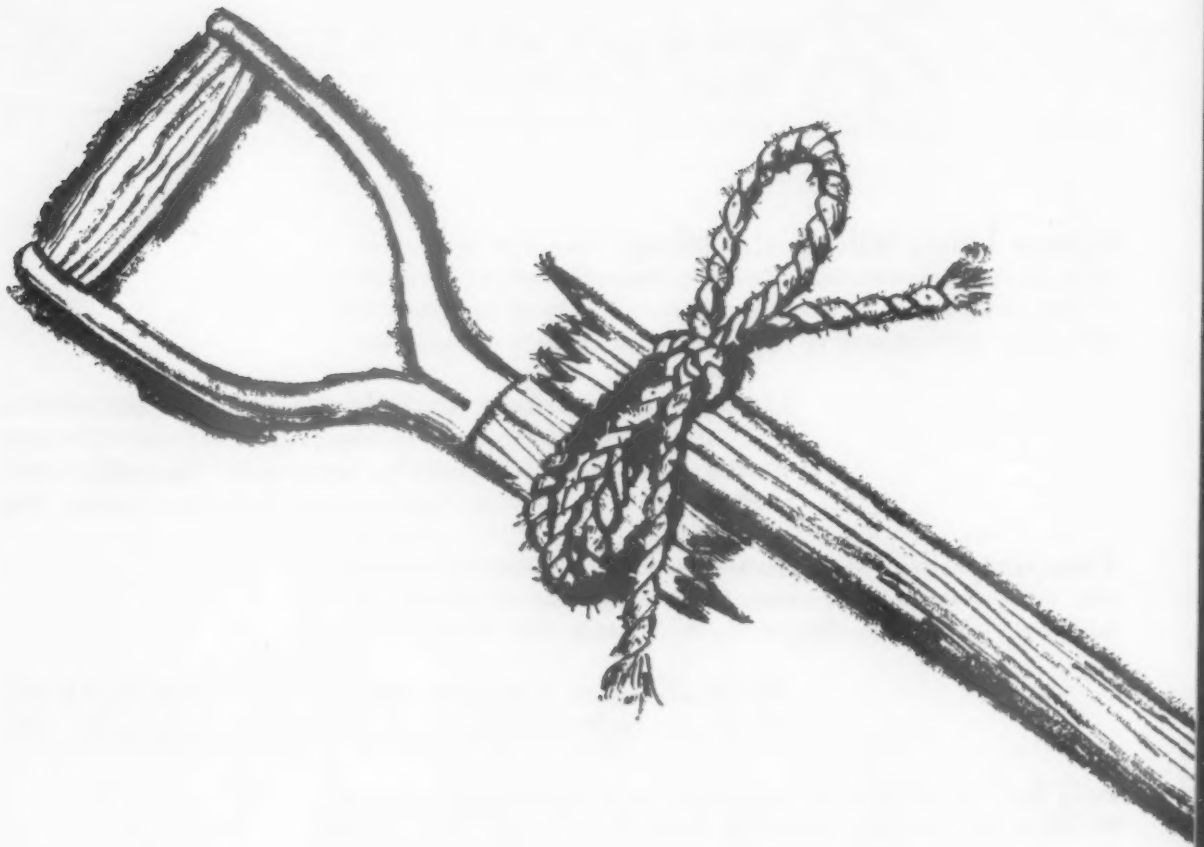
If your groundskeeper has to cope with slopes, buy him some Vulcanil *(Alco Oil).* This elastomeric spray forms a web-like porous mulch that will stay in place plenty long enough for grass seeds to germinate. **(253)**

Maybe the new wall-mounted cooler that serves 60 8-oz. cups of coffee per hour *(Taylor)* is the answer to your office coffee-break problem. **(254)**

Magna-Bar is wunderbar. Let it do your maghetic chores. Permanent, non-electric unit *(Eriez),* only 1x1 in. in cross-section, can be had in standard widths from 4 through 72 in. in 2-in. increments. Said to be most powerful magnet of its size. Designed for do-it-yourself installation. **(255)**

Aisles to mark? Or parking lots? Might consider ¾-gal. marking machine *(Sweet)* designed expressly for small-plant use. Three line widths—4, 3, 2 in. Adjustable line guide. Also available: 1½-, 2½-, 5-gal. machines. **(256)**

Turn the page



IDEAS OF THE MONTH . . . *Begins on page 204*
(For more information, circle item numbers on Reader Service Card next to back cover)

Corner Former (*Servicised Products*) is exactly that. Pre-molded plastic material puts smooth, rounded corner (1-in. radius) on poured concrete—columns, pillars, piers, beams. Easy to use and re-usable. **(257)**

Asphalt pavement need patching? Let Hot Witch (*Charles Machine*) do it—with hot or cold mix. Roller's heated from 20-lb. bottle of propane. **(258)**

To keep stubborn materials moving through bins, chutes, hoppers, consider explosion-proof electric vibrator (*Cleveland*). You can adjust vibration impact from 385 to 110 lb. Weighs 51 lb. Practically noiseless. **(259)**

Permeter (*Ameresco*) permits you to pre-test workers assigned to handle parts that might be easily corroded by hand perspiration. **(260)**

Now you can transmit written messages or sketches over telephone or radio circuits—with Electrowriter (*Comptometer*). Sender merely writes with ballpoint pen. As pen is moved, remote receiver reproduces copy. **(261)**

Spokesman (*Jetronic*) is a 4-lb. transistorized 2-way radio for plant maintenance crews. Operates on 27 mc. citizens' band frequency. **(262)**

Remember Joe Cook's collection of "objects no bigger than the palm of a man's hand?" Joe would have welcomed this 5-oz. geiger counter (*Gelman*) that fits into shirtpocket, crackles loudly when radiation reaches 1mR/hr., changes to smooth buzz at 10 and to high-pitched whine at 100. **(263)**

Neatest little corrosion show-er-uppers we've seen are Magnafilm Indicators (*Crest*). Fine for slipping into small packages of precision parts. **(264)**

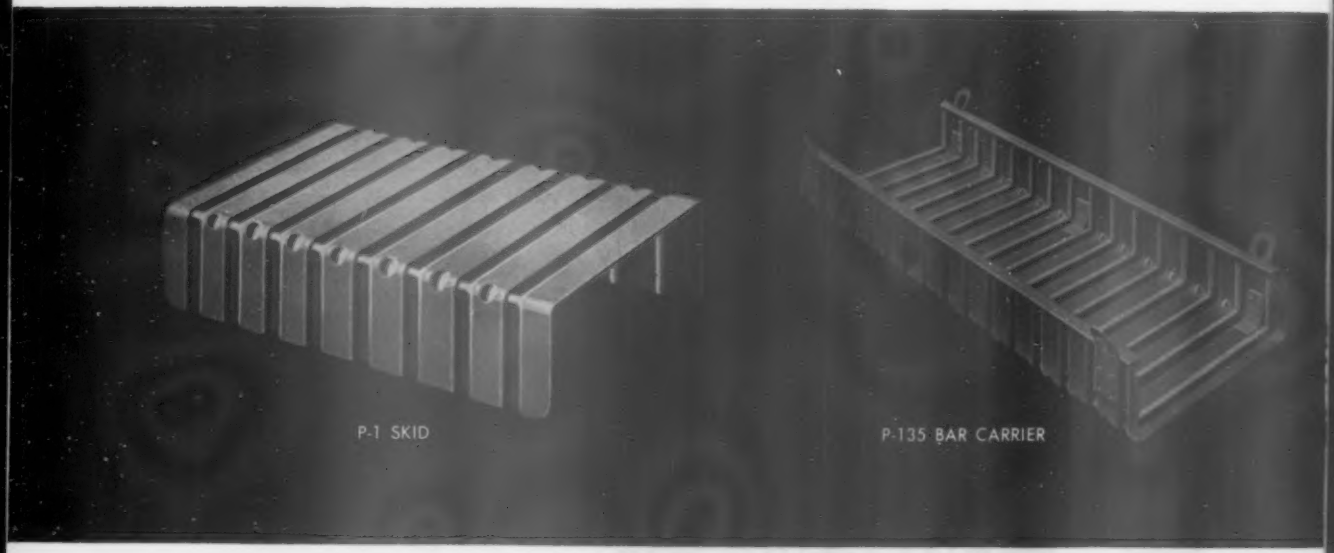
Screw Fastening of Aluminum is latest in series of technical booklets (*Reynolds*) on fastening methods (riveting, welding, brazing, etc.). It's packed with data on many types of screw fasteners used to join aluminum assemblies. Includes recommended hole sizes. **(265)**

Classroom Presentor (*ICR Corp.*) is pegboard, magnet board, flannel board, turnback pad board, front and rear projection screen, all in one. **(266)**

And that prompts us to bet you'll be fascinated by story of manufacturer who switched to Speed Nuts to assemble cost savings of 80%. Just one of 17 convincing case histories in handsome brochure (*Tinnerman*) you get by merely circling No. 267 on Reader's Service Card (next to back cover). **(267)**

A MAKE-SHIFT
HANDLING SYSTEM
IS TOUGHER TO DETECT
Defects can be obvious or they can be hidden. When you choose something as complex as a materials handling system the defects may be hard to recognize.
Specify GUARANTEED American Monorail and relax in the knowledge that you cannot buy a safer, more dependable, more efficient overhead handling system. Our engineers are experts . . . we've specialized for 34 years.
Write for Free Booklet with 56 pages, 99 photos.
ENGINEERED MATERIALS HANDLING
1114 EAST 200th STREET CLEVELAND 17, OHIO
AMERICAN MONORAIL
DIVISIONS: Conveyor Division, Tipp City, Ohio – Canadian Monorail Co., Ltd., Galt, Ont.

REPUBLIC SKID UNITS SAVE TIME, MONEY, SPACE IN HANDLING HOT FORGINGS AT PARK DROP FORGE COMPANY, CLEVELAND, OHIO



P-1 SKID

P-135 BAR CARRIER

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Stop Misusing Your Management Meetings

AN ESTIMATED $4-BILLION WAS SPENT ON BUSINESS MEETINGS LAST YEAR, ACCORDING TO N. L. HALPERN, PRESIDENT OF THEATER NETWORK TELEVISION, INC., NEW YORK. THAT MAKES MEETINGS BIG BUSINESS, WORTH LOOKING AT CAREFULLY. THE BOOKLET "FOCAL POINTS FOR IMPROVING EXECUTIVE MEETINGS," DOES JUST THAT. IT'S A REMARKABLY PERCEPTIVE BOOKLET ORIGINALLY PUBLISHED BY THE YOUNG PRESIDENTS' ORGANIZATION (YPO), 375 PARK AVE., NEW YORK 22. IT WAS WRITTEN FOR CORPORATION PRESIDENTS, BUT IT'S FULL OF IDEAS THAT COULD BE JUST AS USEFUL IN THE PLANT.

WE'VE BRIEFED THE BOOKLET DOWN ON THESE AND THE FOLLOWING PAGES. AND YOU CAN GET THE ORIGINAL BY WRITING THE YPO. BUT THE SUPPLY IS LIMITED-ED.

Your meetings are not an activity in themselves. They are a tool —a communications tool for getting action results in the plant. Plenty has been written about meetings. Much of it critical of the meeting as a time waster, a social event, a private soap-box, or an opportunity to dilute individual responsibility. But the meeting is potentially one of your most effective and productive management devices, if you understand its dynamics and exploit its possibilities.

Following are 10 rules (capsuled above, right) to help you focus on the meeting process. If you understand and practice them, your meetings will be smoother. And you should notice an improvement in your action results in the plant:

1. PLAN TO SOLVE A PROBLEM— NOT TO HOLD A MEETING

The cost of a meeting—in wages and salaries alone—can be terrific. So don't waste time drifting. Plan. Know why you want to call a meeting. Ask yourself:

- What's the problem?

FOR PRODUCTIVE MEETINGS:

1. Plan to solve a problem—not to hold a meeting.
2. Use the meeting as a tool.
3. Pick each member as a resource.
4. See your meeting as others see it.
5. Don't tolerate late attendance, interruptions, etc.
6. Share the responsibility for starting out right.
7. Change your leader style to fit the type of meeting.
8. Harness a variety of skills to get sound decisions.
9. Diagnose and treat the meeting's "Hidden Agendas."
10. Build a bridge from the meeting to the goal.

- What are the related facts?
- How can we solve the problem?

Too often we think we're planning when we're finding a good meeting place, checking on time and availability of members, and setting the date. But this is scheduling, not planning. The time you spend asking yourself hard questions—not about the meeting but about the problem—can be a real money saver.

2. USE THE MEETING AS A TOOL

There are good and bad reasons for calling a meeting—and you should know the difference. The basis for your use of meetings (or your neglect of them) may be worth questioning. A meeting is only one of several communications tools. Other tools are often just as good or better. Telephones, for instance. Or memos. Or private conversations.

A meeting may also be used as an escape or excuse. Ask yourself these questions from time to time:

- Is a meeting really necessary to accomplish this task?
- Could I get this job done at some other meeting, later?
- Am I calling this meeting to get some listeners and increase my own sense of importance? To get other people to do my homework for me? To pass the buck on responsibility?

Here are some good occasions for calling a meeting:

- When you must be sure your message will be understood. Most managers have experimented rather widely with written communications and are aware of the limitations of this one-way method.
- When you want to get subordinates' reactions and stimulate two-way communications. By himself, a subordinate is bound to tell you what he thinks you want to hear. In a meeting, he'll gang up with others and tell you the facts.
- When you need more facts or expert opinions.
- When you need creative new ideas, approaches, and solutions. The clash of ideas in a group can often produce superior solutions.
- When you must depend on others to carry out decisions. It's well known that people support what they help create.
- When you want to build better teamwork. Don't restrict meetings to crises. Members need to feel they have a part in the creation and growth of their organization.

3. PICK EACH MEMBER AS A RESOURCE

Think twice before you flip the switch to call your "kitchen cabinet" into a meeting. When you've got a problem, "Smith," "Jones," and "Green" may first come to your mind. The reason you call them may be that they are the smartest, quickest, and best informed members of your organization. Or is it because they can do you the most good in your future? Or because they usually agree with you? You should make sure you have good reasons for calling in these men.

But, depending on the problem, there are compelling reasons why you should call in various other kinds of people, without regard for their rank, age, position, or even whether you like them or not:

- The idea man. Maybe not all his ideas are good, but they may stimulate thinking.
- The company's informal "communicator." He seems always to know everything that's going on throughout the shop.
- The compromiser, who can help smooth things over.
- The technical expert.
- The man who should give his "blessing" to the project. He has informal power.
- The guy who has all the facts.
- A key member of the department that might block this project.
- Representatives from interested groups (foremen or unions) who could help sell the project.

But it's important to be clear about what happens to a meeting each time you add a new member. According to communications experts, you're not merely ADDING to the complexity of the group—you are MULTIPLYING its complexity. A good rule of thumb is this: Use all the people you need as resources. But make it the minimum number.

4. SEE YOUR MEETING AS OTHERS SEE IT

When your members are with you—really going along with what you're trying to do in a meeting—the job is easy. But you can't assume this will happen automatically. Too often the members have other purposes in attending your meeting. They have other goals in mind. And they may work at cross-purposes to your meeting goals unless you do something about them—both before and during the meeting.

Before the meeting you might take these steps:

- Send the members the problem in advance. Ask them to do some thinking about it. Ask for plans, approaches, and possible holes in your plan.
- Distribute a tentative agenda. Ask for comments or additions to it. Be sure you acknowledge contributions when you meet.
- Brief members on the meeting and ask them to take action beforehand, such as preparing statistics or getting a few reactions to an idea.

Don't assume that announcing the agenda beforehand will eliminate conflicting interests at the meeting. Deal with them again at the start of the meeting. One way of handling this, especially in regular staff meetings, is through the use of "agenda budgeting." Here's a good procedure for budgeting an agenda:

- Use chart pad or blackboard to list agenda items you've selected for the meeting.

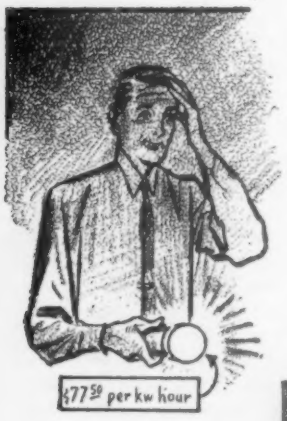
Turn the page

Facts of Light!

CHAMPION Lamps

SOMETIMES IT COSTS MORE TO OPERATE ONE FLUORESCENT THAN TO OPERATE TWO

When only one fluorescent lamp is operating on a lead-lag ballast designed to handle two lamps, more line current can be drawn than if both lamps were operating. This is due to a shift in power factor. Moral: keep all lamps operating — you can draw less current and get twice the light.



IT COSTS $77.50 per KW hour to RUN A FLASHLIGHT

When a lamp is run on a flashlight battery the power cost is in the vicinity of $77.50 per KW hour. The power cost to operate lamps from residential electric supply is only 2.66 cents per KW hour.

A LITTLE VARIATION IN VOLTAGE CAN MEAN A LOT IN THE LIFE OF A LAMP

Incandescent lamps are designed to yield maximum lighting economy when used on circuits where the voltage is the same as that printed on the bulb. When the circuit voltage is 5 volts above the bulb rating lamp life can be cut in half. A variation of 5 volts below rating can double lamp life.

YOUR NEW CHAMPION LAMP HAS ALREADY BEEN LIGHTED AT LEAST 7 TIMES

Every Champion lamp is lighted a minimum of 7 times before it is packaged. Checks like this are typical of the strict quality control maintained at Champion and one of the reasons why the Champion Diamond on the outside of a lamp means a dependable source of light on the inside.

CHAMPION LAMP WORKS, Lynn, Massachusetts

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Begins on page 210

• Ask members for additional items they'd like to have covered.

• Help the group decide what priorities to give each item, labeling them, for example, as: urgent; important, today; important, this week; individual attention.

• Work with the group to budget time to be spent on each item.

• Review and revise time budgets during the meeting.

You may find that this joint agenda setting may take six or seven minutes. But this time spent in getting squared away for even an hour-long meeting is a worthwhile expenditure in "getting your people with you."

5. DON'T TOLERATE LATE ATTENDANCE, INTERRUPTIONS, ETC.

To set up ground rules, do these things before the meeting:

• Give at least 48 hours' notice of time and place. Impossible? You'd be surprised how often it can be done. And the number of "emergencies" somehow decreases.

• Tell how long the meeting will last. How can you tell? Once you start predicting, you'll become more and more accurate. Many men can tell within minutes.

• Tell exactly why the meeting is called. A good reason can make a lot of difference in the attitudes of those attending.

• Tell what the meeting is expected to accomplish. Don't say, "To discuss a new product." That's too vague. Say: "To set up production schedules for Model 7A."

• Tell each man why he's invited and what he's expected to do. Don't hamstring people with rigid assignments, but suggest beforehand: "Jones, would you be ready to look at this in terms of possible production snags?" "Rogers, would you just listen in? You'll be facing this problem next year."

And here's what you can do at the meeting:

• Insist on prompt attendance. And always be on time yourself for your own and others' meetings.

• Don't allow phone interruptions. Have calls held for answering at breaks or right after meetings.

Turn the page

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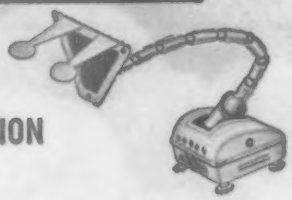

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• Have the meeting room checked beforehand for ventilation, quiet, paper, and pencils.
• Arrange the seating to fit the meeting.

6. SHARE THE RESPONSIBILITY FOR STARTING OUT RIGHT

The more important the meeting, the more concerned you may become about starting it off well. But the more concerned you get, the more likely you are to start off wrong. Why? First, because you're worried. And probably taking all the responsibility on yourself. You're not thinking about letting the other members share this responsibility. So they're not thinking about how they can help.

A second trap is related to the first. Maybe you're over-prepared. In your concern for the job, you forget to consider the feelings of these other members.

Much depends on your faith in the group's ability to solve problems, and your willingness to let them take the bull by the horns. There are a number of specific things you can do to avoid these two traps:

• Be sure everyone clearly understands the long-range objectives—where this meeting fits into the larger picture.
• Restate just what the meeting is for.
• Tell each person (again) just why he is there.
• Inform everybody of the meeting plan before you work on the agenda.

But don't be a mother hen. It's easy to over-plan what each member should do. After a general briefing, let members be flexible about how they participate.

7. CHANGE YOUR LEADER STYLE TO FIT THE TYPE OF MEETING

Meetings fall generally into five major categories. For each category you'll find one style of chairmanship is usually best:

• Meetings for information giving—Addressing civic groups and explaining directives call for autocratic leadership because it's from you to them with no need for reactions.
• Meetings for information collect-

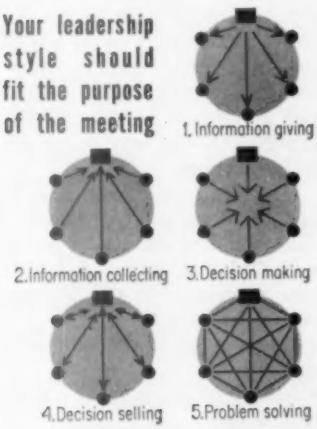
ing—Interviewing employees, hearing union committee opinions, and getting reports call for shared leadership because lots of participation is important to get the facts. Members stimulate each other.

• Meetings for decision making—Planning a cost reduction program or setting up a work schedule calls for shared leadership because each member can perform useful functions, and follow-up is needed.

• Decision-selling—Getting acceptance of new organization set-up passed down by the front office calls for autocratic and shared leadership. Autocratic with regard to the decision, shared with regard to carrying it out. Again, commitments to action are needed.

• Meetings for problem-solving—Helping each other find the best ways to handle subordinates calls for shared leadership because it requires flexibility and the use of all resources available.

Your leadership style should fit the purpose of the meeting



A meeting is a group of individuals interacting with each other in some pretty complex ways to try to get a job done. So it is vital that they stick together as a group and develop teamwork en route to the goal. What's more, most meetings don't reach the ultimate goal *at the meeting*, but later on, in actions back on the job. If a member is not really on the team during the meeting, he's less likely to do his share in carrying out the decision afterwards. So hold the group together.

Turn the page

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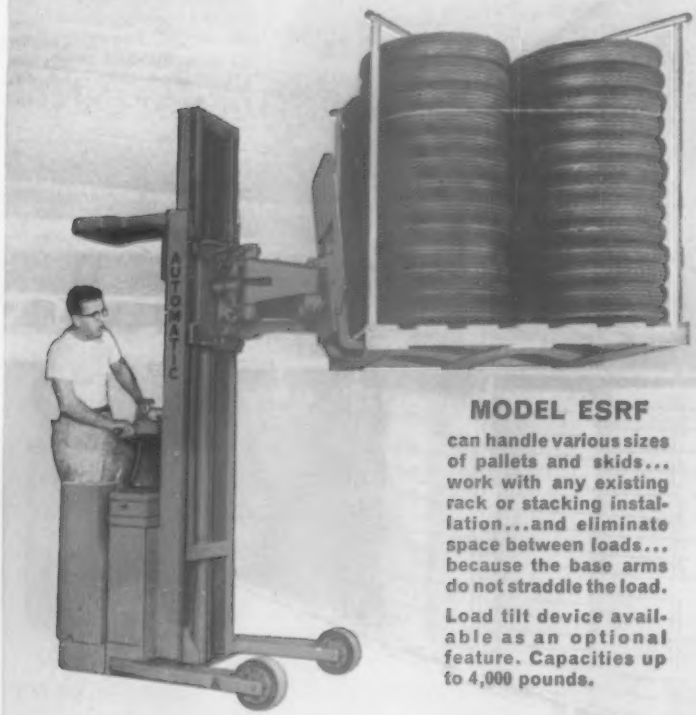

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Some aids to this objective:

- Help quiet members participate.
- Compliment the group on the progress it is making.
- Relieve the tension with a joke or story.
- Mediate arguments.

8. HARNESS MANY SKILLS TO GET GOOD DECISIONS

Studies of the way decisions are made in meetings reveal that many groups, often at high levels, do a distressingly poor job of decision-making. To test your performance, keep tabs on the movements of decision-making meetings through these five phases:

- Pinning down the problem.
- Collecting information.
- Finding alternative solutions.
- Testing alternatives.
- Determining action.

Of course no meeting group is likely to proceed logically and systematically from the first to the last phase. But if your group jumps almost immediately to the last phase without further defining and redefining the problem, or concerning itself about facts, it will be behaving immaturely—the way many groups do in meetings.

Here are some factors that often tend to block good decisions—ask yourself if they affect your meetings:

- Grabbing at the first few alternatives suggested on the assumption they're the only ones.
- Jumping to a decision without testing it.
- Asking people to make a decision without data.
- Failing to *build in* an action commitment.
- Placing decision responsibility too high.
- Having the leader state his position too soon.
- Failing to take an experimental attitude. This is from a fear of failure—"Let's not take chances."

Below are six functions, all necessary parts of the decision-making process at your meetings. Ask yourself questions like these:

1. Defining the problem—How well was the information assembled? Was the importance of the problem really understood?

2. Clarifying—Was questioning encouraged? Were members asked to help clarify the problem?

3. Keeping discussion on the beam—Were members concerned about staying on the subject? Were temporary digressions permitted?

4. Summarizing—Who did the summarizing? Did he come in at the right time?

5. Testing consequences of the emerging decision—How did we know when we were ready for a decision? What checks were made on the decision's realities?

6. Decision-making—How was the decision made: Majority vote? Consensus? Silent consent?

9. DIAGNOSE AND TREAT THE HIDDEN AGENDAS

Long experience confirms the fact that even the best of people—when you get them together—do not always work logically or react intelligently. Below are some useful clues to this mystery. Dr. Leland P. Bradford, director of the National Training Laboratories, claims it results from a meeting's "Hidden Agendas."

"Groups work simultaneously and continuously on two levels," says Dr. Bradford. "One level is formally labeled . . . This is the obvious, advertised purpose for which the group meets.

"Unlabeled, private, covered, but deeply felt and very much the concern of the group, is the other level. Here are the conflicting motives, desires, aspirations, and emotional reactions of the group members . . . problems which, for a variety of reasons, cannot be laid on top of the table—the Hidden Agendas."

Groups work hard on either or both of these agendas. A group may have been working hard on its surface agenda and getting nowhere. Suddenly it starts to move efficiently on its appointed job and quickly reaches a conclusion. Explanation: The group had to work on its hidden agenda and get it out of the way before it could go to work on its real job.

Some typical hidden agendas:

• The plant manager has a hip-pocket solution to the production-line problem being discussed. He

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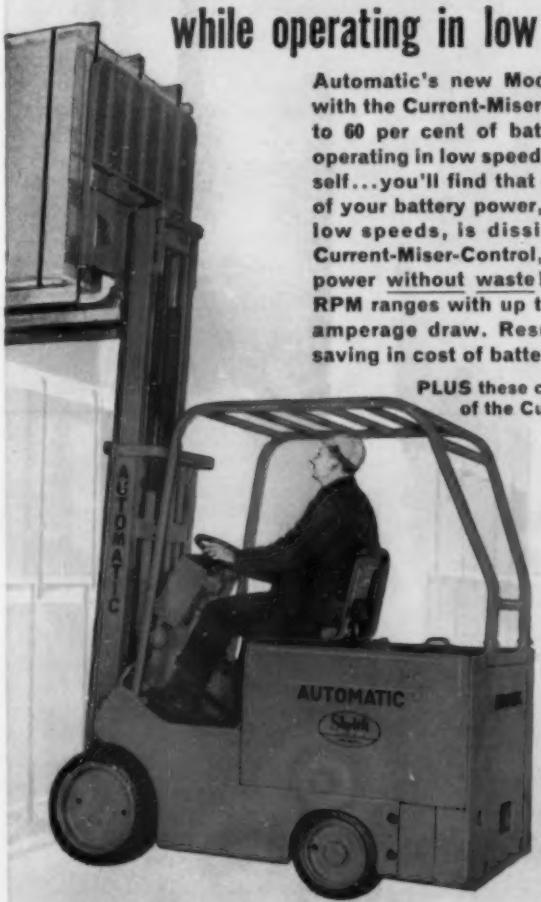

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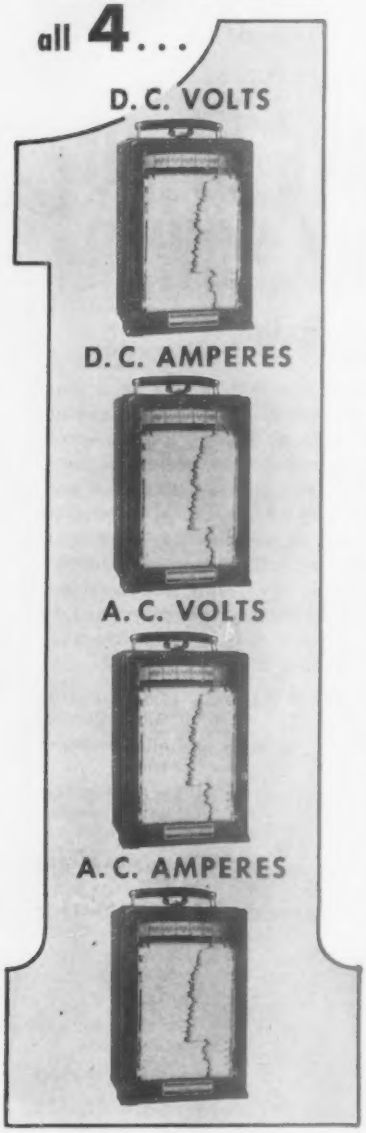

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Begins on page 210

wants the production planning committee to buy his solution. He waits his chance to slip it into the discussion. But meanwhile his mind is closed to everything else.

• The sales manager is in a meeting to discuss quality problems. Some of the problems are caused by errors in specifications made in the engineering department, which is managed by his best friend. Although he's not present, the engineering manager is an "invisible member" of the meeting.

• When a new committee is formed, even among people who know each other, each individual is concerned with his place in the group. Each wants to know what's expected of him and how far he should move. And depending on how important the group is to him, this need for respect or position or power will be more or less intense. Hidden agendas are almost always at work in these opening moments of a new committee's first meeting.

You need to be equally aware of the effect hidden agendas of various kinds may have on you in the leading role.

Hidden agendas often relate to you and your leadership. A man may compete with you (often without realizing it) for influence over the others. He may feel hostile to all leaders. He unconsciously may be dependent on you, need to lean on you. Another may support you because you have power to aid a special interest of his.

The group itself may have a hidden agenda in relation to you, the leader. (Ask yourself: Are you *really* its leader?)

Finally, of course, you may have your own hidden agendas. One of these may be your (carefully hidden) desire to box the ears of a subordinate. Another may be a hip-pocket solution to the problem at hand. Still another may be your need to maintain leadership at any cost.

Here are several ways of approaching hidden agendas:

• Be alert to their presence.

• Keep in mind that the meeting operates at two levels. Don't always expect top-speed action on the surface task assigned. Other problems

Turn to page 222

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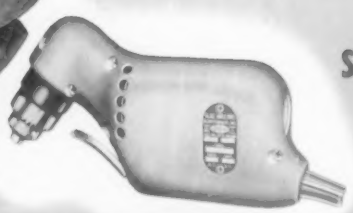

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SIOUX

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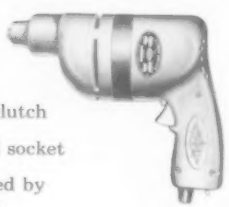
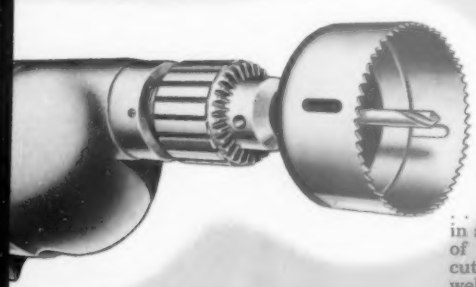


No. 242

It fits the hand, and operates in restricted space like no other electric screwdriver. It quickly drives or removes all types of screws. No. 242 has a positive clutch; the operator controls the tightness by the amount of pressure applied. No. 246 has an adjustable clutch, so that it can be preset for any uniform degree of tightness desired.



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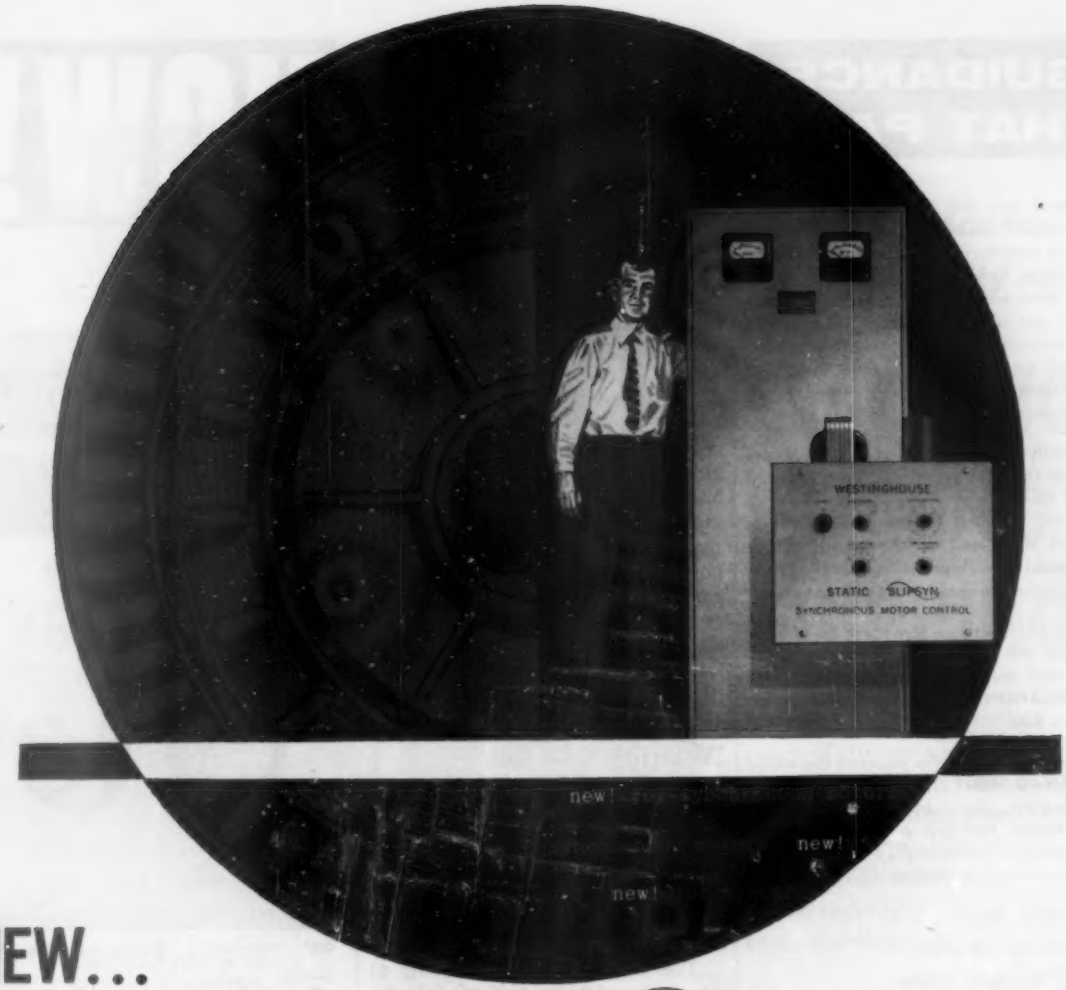

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Begins on page 210

of personalities may be gnawing at each other underneath.

- Make people comfortable enough to bring out their hidden agendas. Encourage them to talk it over.
- Don't force discussion of a subsurface problem that can't really be faced at the moment.
- Don't get angry or discipline the members for their hidden agendas. They can't help them—don't even know they have them.
- Help members develop ways of handling hidden agendas just as they handle surface agendas—by resolving the problem.

Hidden agendas are neither good nor bad. They're simply part of the game. But we need to be conscious of them and deal with them the way we deal with the surface problems. They're every bit as *real.*

10. BUILD A BRIDGE FROM THE MEETING TO THE GOAL

You want results, not meetings. You want results in terms of decisions carried out, actions taken, things done. Unless a meeting produces results afterwards—no matter how successful it seemed to be at the time—the meeting failed.

Too often what you're going to do afterward isn't planned until the meeting is over—then it's too late. Follow-up should be:

- Planned before meeting.
- Planned during meeting.
- Re-planned before the end of the meeting in terms of action.

Planning *follow-up* at the start of planning *the meeting* happens automatically if you are really viewing the meeting as a means, not an end. In this case you'll be looking at the ultimate goal and considering how the meeting will help move toward that goal.

A common method for planning follow-up is through minutes of the meeting. These minutes are often a colossal bore and practically useless because either too little or too much is recorded. Don't boil them down until the content is boiled away, and don't keep volumes of word-for-word notes. The key to the problem lies in making a distinction between meeting content and meeting procedures. Get on-the-spot

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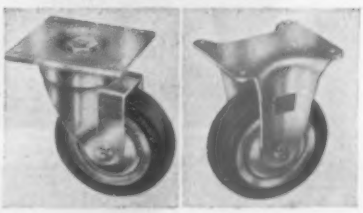

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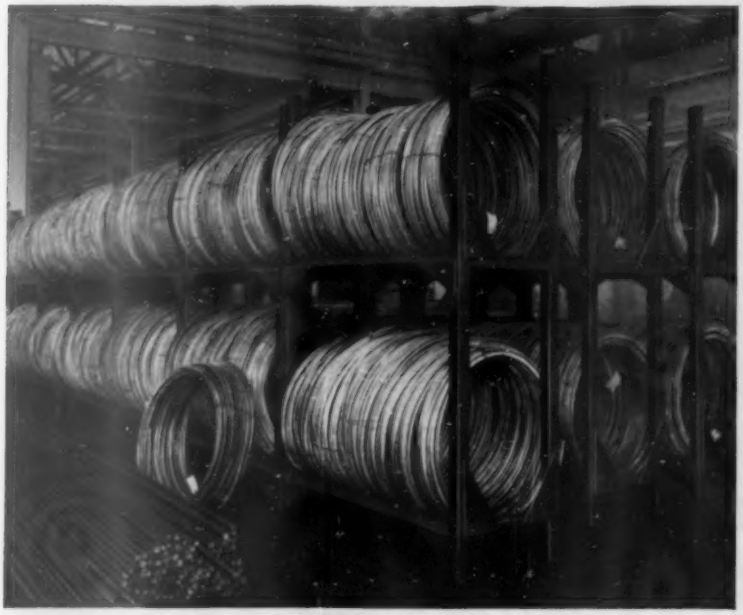

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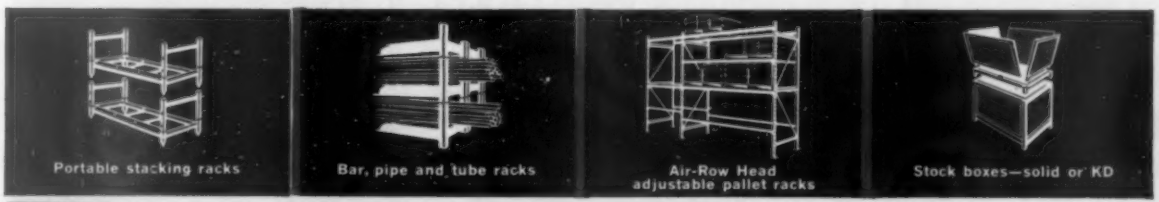

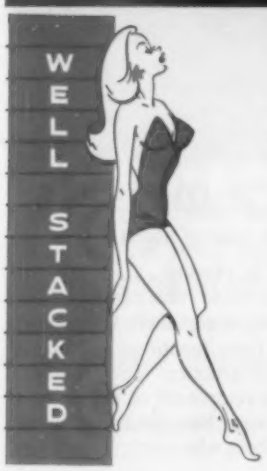

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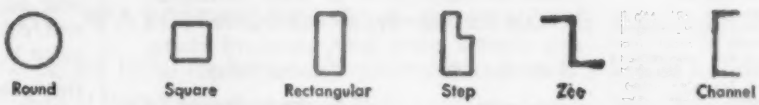

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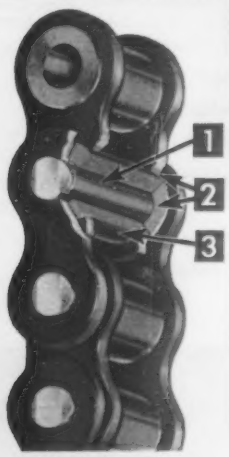

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PIN—Protective oil film lubricates live bearing area between pin and bushing, minimizing wear by reducing metal-to-metal contact.

Critical Area 2:

PLATES—Oil-impregnated Sintered Steel Bushings extend beyond surface of inside plates to: act as lubricated thrust bearings, control clearance, and provide an oil cushion between plates, eliminating plate galling and seizing frequently caused by misalignment of sprockets.

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Chain drives on farm machinery take a beating. Dust, dirt, corrosion and rust—inadequate lubrication, and hit-or-miss maintenance, all add up to "stiff joints"—the major cause of chain failure.

John Deere provides owners of its 494 and 495 Planters with extra insurance against drive chain trouble by using advanced design Whitney MSL* Self-Lubricating Chain on main drives of these machines. Because John Deere engineers recognized the advantages of MSL Chain's built-in lubrication at all 3 critical chain areas, farmers aren't bothered with the usual problems encountered in equipment drives. And they get longer chain life—up to 5 times longer—than that provided by conventional chain.

If the drive chain on your product must deliver top performance in severe operating environments, or operate with maximum cleanliness, Whitney MSL Chain can do the job. Standard and Extended Pitch MSL Chain conforms fully to ASA Standards, making it completely interchangeable with any similar pitch ASA standard chain. Write for MSL Chain Catalog today.

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POWER TRANSMISSION DRIVES

MANAGEMENT MEETINGS

Begins on page 210

highlights of what the meeting produces, not what goes on.

Follow-up action taken only at the close of the meeting may be too little and too late. Often a group makes a decision, sighs, "Thank Heaven that's done!" and files out of the conference room under the impression that the meeting goal has been reached. Far from it. You've merely made a decision.

The second phase of the problem is "How to get the action carried out successfully?" You're safer if you can create for yourself a mental picture of two meetings in one. The first meeting makes the decision, the second plans to carry it out. Possible approaches:

A. Test its consequences . . .

- What does it mean?
- How does it relate to other projects and policies?
- Is the decision possible? Is it realistic?
- How about cost, time, people to carry it out?
- What are the possible effects on other departments, customers, suppliers, the community?

B. Test understanding and member commitment . . .

- Is everyone clear about what this means?
- Is each one willing to go along?
- Are there any other concerns or misgivings?
- Does anyone see major pitfalls?

C. Plan next steps . . .

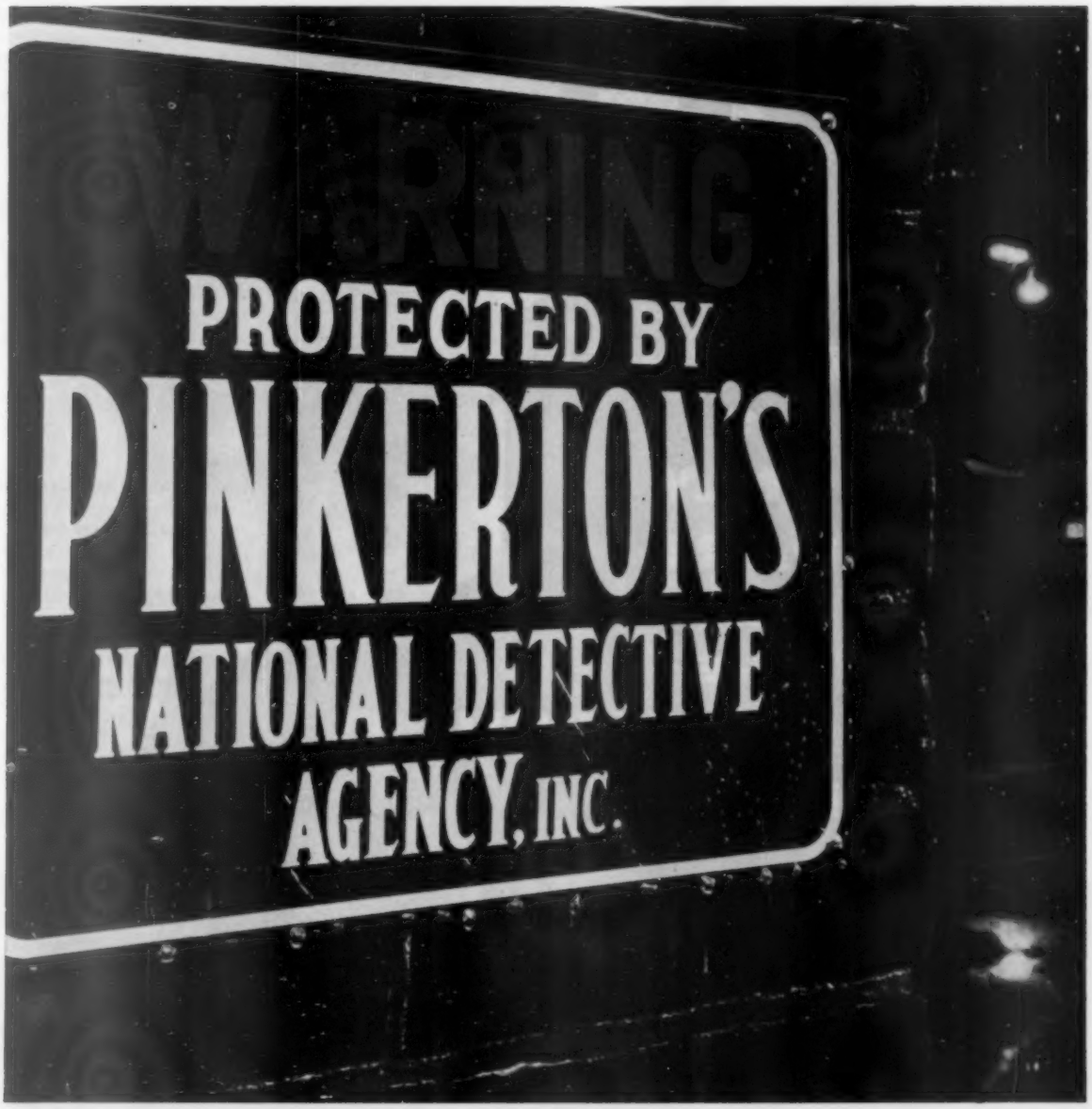
- Who does what?
- Who will coordinate?
- How about follow-up reports or meetings?
- What schedule of time, place, and people?

Follow-up that commits members to action and builds a bridge from the meeting to the goal is the final focal point for getting payoff from your meetings. But this payoff will also depend upon everything else we've been talking about.

One point in closing . . .

While all these rules can be useful to you, don't expect them to produce results in your meetings without a good deal of practice. They require, also, the development of skills—not only your own, but also those of the other members who participate. **END**

"Switching to Pinkerton guards
saved us a lot of money"



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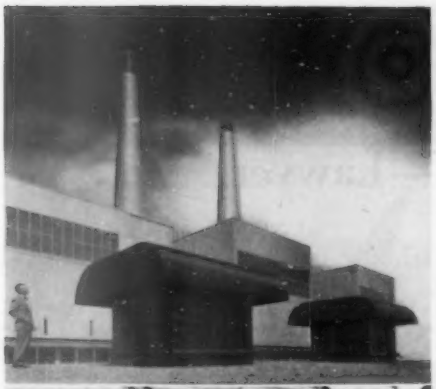
SIMPLE VENTILATION — One of many *Buffalo* types of Ventilating Fans is the Sky-Vent Roof Ventilator, an economical, ductless "package" installation available in sizes to exhaust as high as 250,000 cfm. Photo shows units for one of the country's largest auto frame plants.

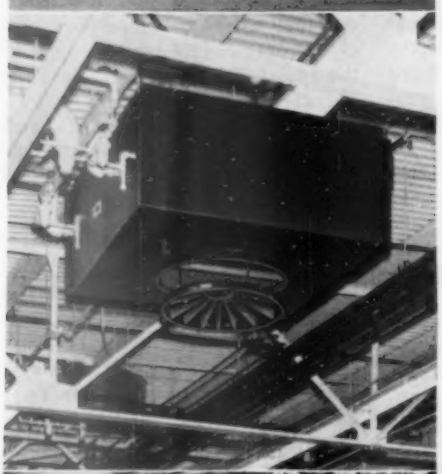
MAKEUP AIR — Where plant air is exhausted, Buffalo Makeup Air Units like this, bring in fresh outside air to replenish the supply. Available with filters and heating coils. This package installation, provides exceptional economy right from the beginning.

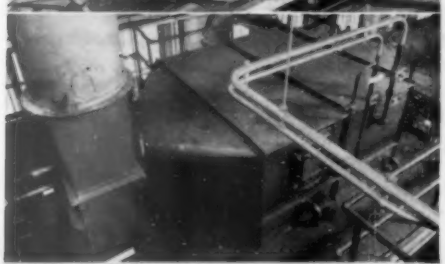
INDUSTRIAL AIR CLEANING —where every problem is a "special" one — *Buffalo* equipment is controlling many objectionable industrial effluents with the least cost and trouble. Ask your Buffalo Engineer for recommendations concerning any problem gas you may wish to have treated for recovery or disposal.

ALL-IN-ONE CONDITIONING is provided by Buffalo PC Cabinets — available for everything from summer cooling to temperature and humidity control, plus air washing. Vertical and horizontal models to fit any installation requirement. The time-proved equipment for all-around air conditioning service — serving every type of industrial and commercial installation.

AIR-COOLED CONDENSERS — *Buffalo* provides cooling, and by the most efficient condensers yet offered! Here is an installation handling liquid Propane. Offers Vertical discharge, easy *Buffalo* installation, low silhouette, refrigerant savings, 7½ to 100 tons capacities.







HERE IS THE FULL STORY IN THIS COMPLETE LINE OF UP-TO-DATE BUFFALO UNITS

Certainly, plant areas require cooling. But air conditioning can do *much more* for your plant! It can start with simple ventilation — exhausting fumes, dust and stale air — supplying fresh air to take its place. It can be simple heating. It can involve humidity control. It can clean the air you breathe in your plant, or the stack discharges your neighbors breathe. ***Buffalo*** has built all types of air conditioning equipment since this field was in its infancy, and has developed it all to new heights of efficiency and simple maintenance.

Illustrations on these two pages show you how wide are the functions of air conditioning by ***Buffalo***. From these you can get a clearer picture of the breadth of this field, and the equipment which could be improving your plant environment — for better quality control, for better production, for better public relations. **Write us about your air problem today and get the recommendations of Buffalo Engineers.**

BUFFALO FORGE COMPANY
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Buffalo air handling equipment to move, heat, cool, dehumidify and clean air and other gases.

Buffalo Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

Buffalo Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

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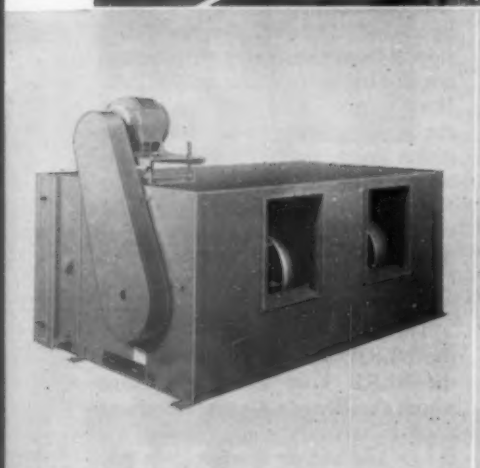

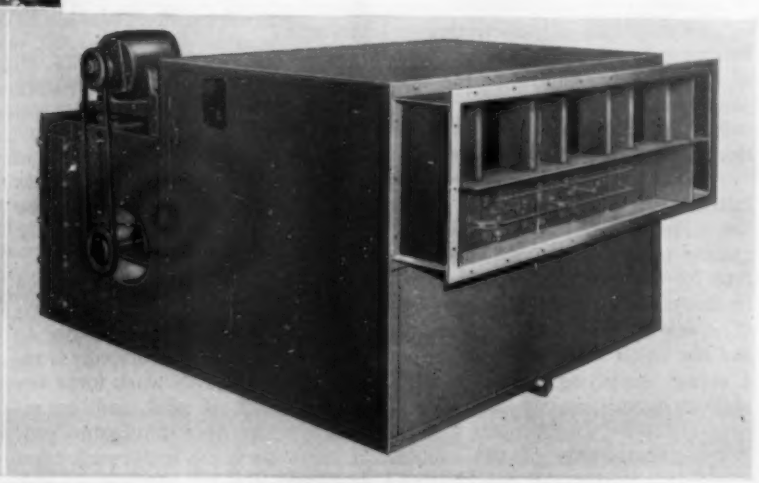

HEATING AND VENTILATING — Here are both functions in a single unit capable of simple ventilation or winter heating and ventilating, with fresh makeup air intake, if desired. For many plants, these units are the answer; for others, they make excellent supplementary units to existing systems.

ZONE AIR CONDITIONING — where you have different areas with different requirements — is ably served by Buffalo Zone Control Cabinets. Complete with filter box, fan section, coil and pan section and zone control damper section. These serve varying degrees of conditioned air for several zones or rooms.

By PAUL A. KING, Member, New York Bar

Legal Language Is Here to Stay—Lawyers, too

Neither plant men nor unions are a match for lawyers—the law protects its own. These two cases prove words are the key to victory in contract struggles.

Lawyers suspect they are not welcomed to the bargaining table by many unions. Their skilled bargaining techniques and precise contract draftsmanship sometimes weave too tight a net for the union's comfort. Whether or not their suspicions are justified, there is a place for them at the bargaining table and a union cannot keep them away.

One Teamsters' local, for example, recently refused to bargain with the K-C Refrigeration Transport Company of Albany, N. Y., unless it turned out its attorney. K-C was willing to negotiate with the local—but only through its attorney. The union insisted that it would do business with the attorney only if K-C first met with the union—without the attorney—to look over its proposed contract. The company stood its ground. So did the union.

The National Labor Relations Board found that by such insistence the union had committed an unfair labor practice. The Board quoted the law: "It shall be an unfair labor practice for a labor organization or its agents . . . to restrain or coerce . . . an employer in the selection of his representatives for the purpose of collective bargaining or the adjustment of grievances." And this ruling applies to lawyers, said the Board.

A recent arbitration case well illustrates the value of a lawyer—or a law-trained person—around the bargaining table, particularly when it's time for drafting contract language. In this case, there was a difference of opinion between the company and the union as to the meaning of a clause qualifying employees for vacation or vacation pay. Employees were to receive such benefits if they "worked two-thirds of the scheduled hours during the period from July 1 to and including June 30 of each year."

The question of interpretation arose this way: An employee was discharged (the reason is not important here). The arbitrator who heard the case reduced the discharge penalty to suspension for four months—from Jan. 14, 1959, to May 14, 1959. The award also provided that the employee was not to receive wages or other benefits during the period of suspension. However, he was granted the right to accumulate seniority.

When the question of vacation for this worker came up, the union argued that he was entitled to the three-week vacation set forth in the contract. He had worked two-thirds of *his* scheduled hours during the period from July 1, 1958, to June 30, 1959. The arbitrator couldn't buy this view. He interpreted the clause as calling for two-thirds of the scheduled work hours of the plant—or perhaps of the department—but certainly not of the employee. The word "his" was missing from the clause. (This demonstrates the importance of words and of lawyers and law-trained persons whose stock in trade is words.)

Beaten down on this point, the union then argued that the employee should be entitled to a pro rata vacation since his suspension amounted to a layoff. The company had previously agreed that employees would be entitled to a partial pro rata vacation if their failure to work was due to layoff or illness.

The arbitrator didn't buy this idea either. He said that "the word 'layoff' is widely accepted as applying to a situation where the company is required to reduce its work force because of lack of work and, consequently, employees through no fault of their own are prevented from working." But this was not the case here.

To further nail down the company's case, the arbitrator pointed out that when the employee's discharge was reduced to suspension, the award said he was not to receive "benefits" during the suspension. To this arbitrator it was pretty clear that benefits included vacation and vacation pay.

After the Election

Picketing may be okay even if the union recently lost an election.

An NLRB Trial Examiner disagreed with the NLRB General Counsel in a recent case. The Trial Examiner said that "Do-Not-Patronize" picketing is okay even though the union has lost an election held anytime within the preceding 12 month period.

One of the recent amendments to the Taft-Hartley Act makes it unlawful for a union to picket for recognition or organization if a valid election had been held during the preceding 12 months.

A retail clerks' union lost a representation election held by the Board by a score of 17 to 2. But that didn't stop it from continuing to picket—nor did the amendment to the Taft-Hartley Act. The only concession the union made was to reduce the picket line to one man who was stationed at the customers' entrance to the store. And it changed the sign he carried to read: Please Do Not Patronize. Retail Clerks 344, Retail Clerks International Association, AFL-CIO.

The store owner filed charges with the NLRB. The case came before the NLRB Trial Examiner before whom the Board's General Counsel argued that:

(1) The recent amendments put an end to "Do-Not-Patronize" picketing in such circumstances. The section of the new law dealing with the

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Sanax was developed to permit frequent cleaning of waxed floors *without washing away the finish* . . . and to eliminate waste in wax and labor. A neutral liquid soap with a wax base, *Sanax* not only quickly removes dirt, oil, and grease, but *leaves a thin film of wax.* In fact, regular use of *Sanax* to machine-scrub or damp-mop waxed floors *actually prolongs the life of the finish,* and thereby reduces refinishing costs on a year-to-year basis.

Like all *Finnell Fast-Acting Cleansers, Sanax* is specially designed for the greater speed of machine-scrubbing, and works as effectually in a *Combination Scrubber-Vac* as in a *Conventional Scrubber-Polisher.* And because *Sanax* is processed from pure vegetable oils, it's *safe for all floors.*

Find out how you can simplify and reduce the cost of caring for waxed floors. *There's a Finnell Floor Specialist nearby* to help you choose the waxes and cleansers that are *exactly right for your needs. Finnell* makes a complete line, so you can depend on unbiased advice. In fact, *Finnell makes everything for floor care!* For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2504 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

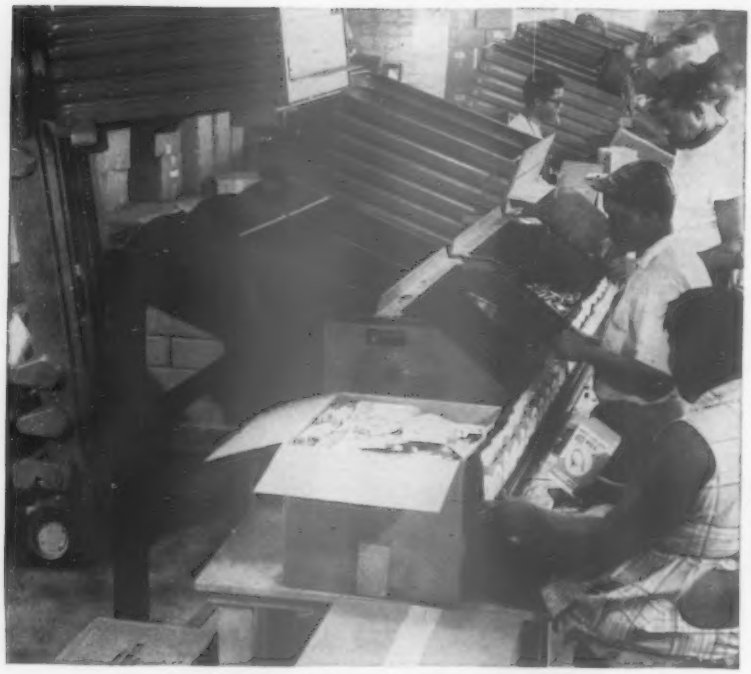
- **A mild liquid wax-soap for machine-scrubbing or damp-mopping waxed floors**
- **Leaves a lustrous anti-skid protective finish**
- **Highly concentrated . . . economical to use**

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES



Powell Flow-Matic system in action on packaging line at Goerlich's, Inc., Toledo, Ohio.

Handling 50 million parts a year with POWELL'S *Exclusive Flow-Matic* System!*

Goerlich's Inc., working with Toledo Society of the Blind, stores, assembles, and packages 50 million muffler parts a year—using Powell's unique Flow-Matic materials handling system. Fast, simplified handling method that can save up to 50% in space handling areas. *Bulletin FM* gives all the details—write for it.

TM*

Unique Powell Flow-Matic boxes in storage area at Goerlich's, Inc. Easily handled and stacked.

THE POWELL PRESSED STEEL COMPANY
50 ERIE STREET • HUBBARD, OHIO
The most complete line of material handling equipment.

For more facts Circle 528 on Reader Service Card

Begins on page 228

12-month election rule makes no exception for informational picketing.

(2) Even if informational picketing was permissible, certainly in this case it was for recognition or organization, and, therefore, was unlawful.

In support of his first argument, he argued that almost all picketing was taboo under that section of the law. He couldn't conceive of any picketing that would not have, as its purpose, recognition or compulsion of employees to join the union. The Trial Examiner responded by pointing out a situation that was not recognitional. For example, the object of the picketing might be to get the customers of the store to patronize other stores that are unionized. He also voiced the opinion that if the General Counsel was right and no picketing whatsoever was allowed under the section, it stood a good chance of being declared unconstitutional. This certainly was not the objective of Congress in passing the law.

The Trial Examiner also dismissed the General Counsel's second argument because the facts seemed otherwise to him. At the time the law was amended the union had changed its picketing tactics. It was now no longer recognitional.

Sorry, Can't Raise

A company pleads inability to grant a wage increase. Is it enough support for its argument to give the union a statement of comparative sales and profits?

Yes, said an NLRB majority in this case. No, said two dissenting members. During contract negotiations, the company said it couldn't grant wage increases. In support of this contention, it submitted comparative sales and profit statements. That's not good enough for us, cried the union. It wanted a more detailed financial analysis. It also suggested that the company hire an auditing firm to go over the books, submit its findings to an impartial arbitrator who would be empowered to advise the union whether or not he felt that the company could or couldn't give an increase.

The company turned down this suggestion. Claimed that the report

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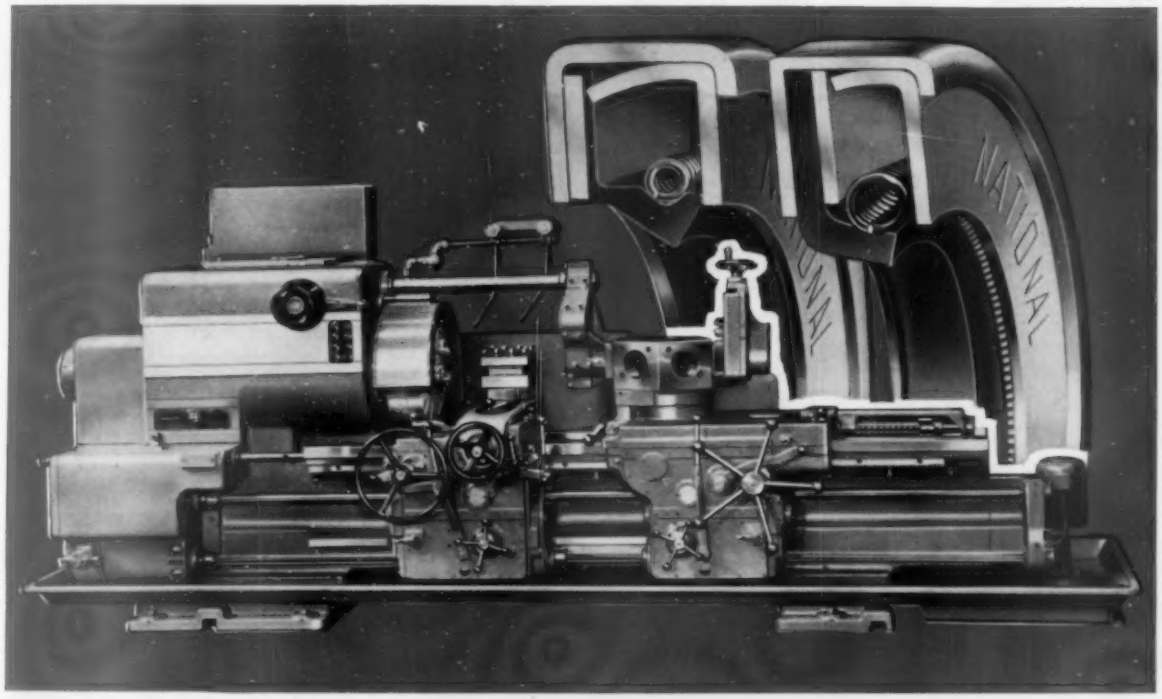

Install National Oil Seals...low cost protection to keep machine output at peak levels

Your Bearing Specialist will help you set up a working stock to handle repair jobs in a hurry

You can depend on National Oil Seals to lengthen vital bearing life, cut downtime losses, and help hold production schedules. They're made to seal *in* lubricant, and seal *out* abrasive dirt. The key to this protection guarantee is the quality construction of every National Oil Seal.

National *Micro-Torc* Seals feature specially processed leather that stays flexible, lasts longer, and runs cooler. *Synteeh* rubber seals are specially blended to meet exacting conditions of temperature, shaft speed, and other critical factors. Both types come in all sizes and are always available for fast delivery whenever you need them. Call your Bearing Specialist. He's nearby for ready help.

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DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

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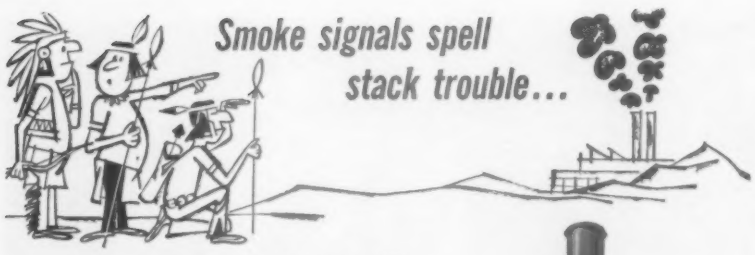

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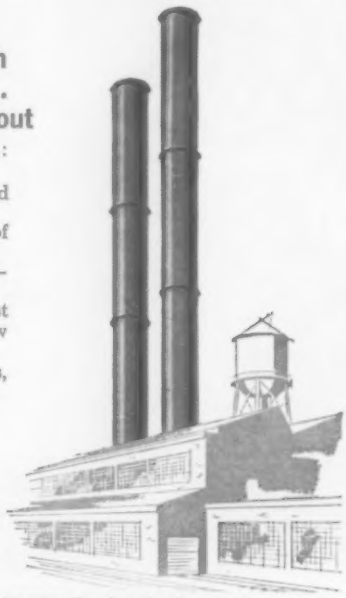

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POUND IT—turn it over—hammer it flat again . . . there's no cracking or chipping!

BEND IT—hammer it double—pound it out straight . . . *still* no cracking or chipping! What other enamel can withstand these punishing tests?

Mail coupon today for FREE test chip and FREE sample of Valdura M & F.

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Attach coupon to letterhead for free M & F test chip and free ½ pint sample.

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ADDRESS_____
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Begins on page 228

it showed the union was good enough for its banks, the Internal Revenue Service and its stockholders. It should be good enough for the union.

The question: Was the company guilty of a refusal to bargain in good faith? The NLRB majority said no —but two members dissented. They felt that the statements submitted by the company "failed to disclose such items as cost of goods sold or labor costs. Apart from showing that increased sales were accompanied by a decrease in profits, the figures presented amounted to scarcely more than a bare assertion of inability to pay." Concluded the two dissenters: The statement may have been good enough for the banks, the Internal Revenue Service, and the stockholders. But it was not good enough for intelligent collective bargaining.

Battle Over Raiding

Two federal courts recently disagreed on enforcement of an umpire's award rendered in accordance with the AFL-CIO no-raiding pact.

When courts disagree on the handling of a labor relations problem, life becomes tougher for managers and lawyers. The legal man's client likes—and is entitled to—a clear-cut answer. How else is he going to run his business? But when the courts disagree, how can the lawyer keep his manager-client happy with a clear-cut answer? Here's an illustration of such an instance:

The story starts with the AFL-CIO no-raiding pact. In essence, unions that sign the document agree to let an impartial umpire settle jurisdictional squabbles. This procedure should make life easier for the poor manager in the middle of the muddle.

In this case, the United Textile Workers and the Textile Workers Union tangled on a jurisdiction problem. The federal court of appeals for the Chicago area decided, under the authority of Section 301(a) of the Labor-Management Relations Act of 1947 (Taft-Hartley), to make the union comply with an award under the no-raiding pact. It reasoned that this was an agreement made between unions. And such agreements

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ADD TO THE ACCURACY OF YOUR DATA PROCESSING!

Now, as information originates, you can create basic input media to accompany your product through manufacturing, inventory and shipping.

You reduce human error when you create basic input media at the point where data starts! A single Dennison Print-Punch setting produces a machine language history of an entire series of operations on a durable flexible ticket . . . virtually eliminates errors due to manual recording, selection and key punching of data.

Low-cost Dennison Print-Punch Machines are simple to operate! They can be operated by anybody and located where you need them . . . from Receiving to Shipping and anywhere in between. Available models simultaneously print and punch 20 column, 25 column or 31 column tickets at a speed of over 300 stubs per minute.

Dennison Print-Punch Tickets are versatile, too! These miniature partners of your present punch cards can travel places and stand abuses that handicap larger input media. Available in continuous strips of single and multi-stub tickets — serially or repetitively numbered — they can be tailored to fit just about any control or accounting system.

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Beat the Problem by
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If you're tired of taking a beating on costly "down-time" take a look at the Ryder lease, a real knockout of a solution.

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Circle 533 on Reader Service Card

Begins on page 228

are enforceable under Section 301(a). Unions that were party to the pact could even be compelled to withdraw a petition for a representation election.

Naturally enough, based on this decision, a toy-workers union expected that a federal court in California would follow the same pattern. But it wasn't to be—even though the facts of the case were similar.

The toy workers had been the sole bargaining agent for the employees of the Cadmium and Nickel Plating Company. A metal polishing union tried to move in on the toy workers. The toy workers invoked the no-raiding pact, which had been signed by both unions. The impartial arbitrator who heard the story decided in favor of the toy workers. Directed the rival union to withdraw its petition to the NLRB. Instead of complying, the union requested an election and won it hands down. According to the election results, the toy workers were out and the metal polishers were in.

Down but not quite out, the toy workers brought action under Section 301(a). They asked the district court to enforce the original award. But this court, surprisingly, respectfully but firmly disagreed with the federal court of appeals that had handed down the Textile Workers decision. Its reason? The court felt that the NLRB is granted exclusive jurisdiction over representation disputes. A no-raiding pact cannot be used to destroy that jurisdiction—no matter how strongly the other court feels about effectuating such pacts. So the toy workers were thrown out of court and the umpire's award was not enforced.

Opinions That Stick

Here's a three-point rule for getting wage-hour rulings you can rely on—know they'll stand up in court.

Oral opinions of Wage-Hour Division personnel may give the plant accountant or personnel manager the answer to a tough question—but they act at their own risk if they operate on what they hear. Under the law, there is only one safe way to get an official Wage-Hour opinion you can

FOR HIGH OR LOW SPEED ROTARY OR RECIPROCATING MOTION . . .

PALMETTO.
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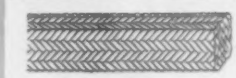

• For the ultimate in durable packing construction choose from the nine *interwoven* packings in the Palmetto Self-Lubricating Packing line . . . Combines density of braid over braid—flexibility of plaited. Send for your copy of SLP-659 that gives service conditions, applications, prices, etc.

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ANSWER
to Worthington "Hidden Value" Puzzle on Back Cover

The fictitious "hidden value" is *Adjustable Roller Main Bearings.* The design of any balance opposed compressor makes roller bearings impractical from a maintenance standpoint. Worthington balanced opposed compressors use centrifugally cast sleeve bearings which can be removed for inspection or maintenance without disturbing the crankshaft or removing the connecting rod from the frame.

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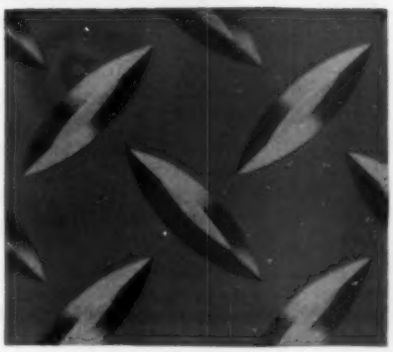
Alan Wood Super Diamond floor plate sheds dirt and water quickly

Sweep it, hose it or mop it—A. W. Super Diamond rolled steel floor plate has no pockets to hold dirt or water. The perfectly designed pattern of Super Diamond makes it the easiest-cleaning floor plate on the market today. You can shear, form, weld and match this floor plate wherever necessary, and the unique arrangement of the pattern allows you to bend it any place.

Super Diamond has many other advantages, too . . . an easily matched well-known design pattern . . . and readily available from warehouses. It wears indefinitely, with no chipping, cracking or splintering. And feet get traction from *every* direction, even when plates are wet.

For safety . . . for easy installation . . . for long wear . . . specify Alan Wood Super Diamond. Write for Bulletin SD.—S10



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Portable Tristand Chain Vise

has Large, Easy-to-Operate

Top Screw Handle right up on top

Here's a real time saver. Not only do you get a complete workbench that's truly portable, but now you get a chain vise that's extra easy and fast to operate. Handle is right up on top where it's always handy. Handle and tightening nut are anchored to vise base . . . can't pull out.

Vise base, that overhangs front legs for clear tool swing, has hanger slots for tools, 3-size pipe bender, rear pipe rest and adjustable ceiling brace screw. Folding legs and integral tray set up easily and lock in position for rigid work base. Snap chain holds folded legs closed for easy carrying . . . no loose parts. Rubber grommets in tristand feet prevent creeping. See and try this more-for-your-money RIDGID Top Screw Chain Vise at your Supply House!

New RIDGID Bench Chain Vises

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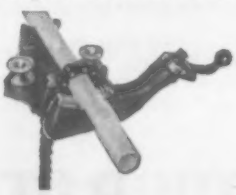
5 Sizes for ⅛" to 8" Pipe, Conduit or Rod



RIDGID

The Ridge Tool Company, Elyria, Ohio, U.S.A.

For more facts Circle 536 on Reader Service Card

Begins on page 228

rely on. Get it in writing. Get it from an authorized Wage-Hour Division employee. And get it with respect to a specific actual situation. Only such an opinion will stand up in court—should the employee sue you (provided, of course, the company relied on it in good faith).

Reliance on statements of Wage-Hour inspectors condoning the exclusion of a bonus from the regular rate of pay didn't help the Mesta Machine Company. Nor was Emerson Radio and Phonograph Corporation aided much when it relied on the Wage-Hour Administrator's opinion at a conference at which the job of the complaining employee was not discussed. True, some federal courts have allowed good-faith-reliance defenses on something less than the three-point program above. And oral opinions relied upon in good faith may dissuade a court from imposing a liquidated damage penalty. But why be satisfied with less than perfect protection when reliable rulings can be obtained in a few weeks?

Pay for Short Report

The language of the contract—not logic—controls overtime work pay, said this arbitrator.

Faced with an employee relations problem in a union plant, the union contract is the first stop on the way to finding an answer. If the language of the contract is express, clear, and to the point—and if there is no recent contrary side agreement or past practice—it's also the last stop. That's how most arbitrators react. Said Arbitrator Charles H. Logan: "Mine will be the duty and the obligation to read the clear cold language applicable . . . and recite my interpretation thereof."

Managers see the same print that an arbitrator would. But they often look elsewhere for the answer and end up in trouble.

The clause in one contract—the one Logan was called on to interpret—read: "An employee called out and reporting for work outside his regularly scheduled working hours shall receive one and one-half times his regular straight-time hourly rate

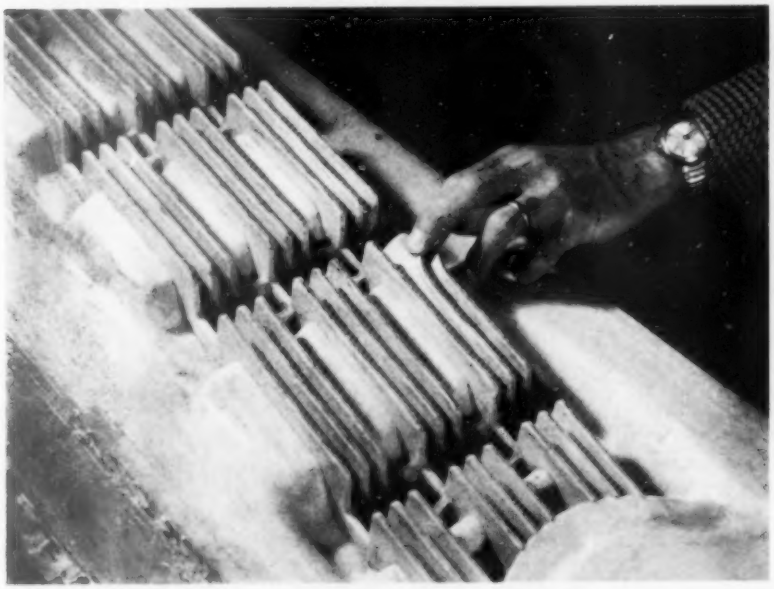
Turn to page 240

first in silicones

Dow Corning

SILICONE NEWS

production and maintenance edition • No. 34



"PROLIFIC" MOLD

Here's a five step procedure for making prototype parts that's fast, easy, and assures more perfect finished parts. It features Silastic® RTV, the Dow Corning silicone rubber that vulcanizes at room temperature.

This five step molding cycle, used by Detroit Plaster Cast Foundry, a division of Racine Foundry and Mfg. Co., in making automotive grills, is from positive to negative to positive to negative to final positive. It's the second positive that makes a difference.

First, they make a wooden positive of the grill. Plaster is then poured over this wooden pattern to form a negative mold. Into the plaster is poured Silastic RTV. From this positive another plaster negative is made. Finally, alloys are poured into the plaster mold to form the finished metallic part.

The second positive, the one made with Silastic RTV, is used over and over again — as many as 30 times! It does a much better job of releasing the plaster mold than wood. Another important advantage: Molds made of Silastic RTV make highly accurate reproductions. None of the complex pattern detail is lost.

Molds made from Silastic RTV offer three distinct advantages: 1) reproduction of fine detail; 2) simplicity of use; and 3) natural release of most materials. It will pay you to investigate this easy way of producing faithful reproductions next time you make prototype parts. *No. 747*

Release With Ease

Problems in molding are rarely identical. But there's one answer that's practically universal in the "mold release" problem area. That's a silicone mold lubricant. Here's a good example:

Robinson Industries, Inc., Coleman, Michigan, faced many molding obstacles. Its end product is a sheet-type insulation for refrigerators. In making the insulation, thousands of small, very light polystyrene "berries" are put in the mold and expanded by steam heat. The expanded material is "clingy", making good release difficult. The intricacy of the molds adds to the problem.

Talcum and several other release agents were tried. Under heat of 300 F and 80 psi pressure, followed by alternating water cooling cycles, none of the release agents worked. Then, a coating of Dow Corning 20 Compound was applied. Robinson found that it not only releases easily, but lasts 10 times longer than any other coating used.

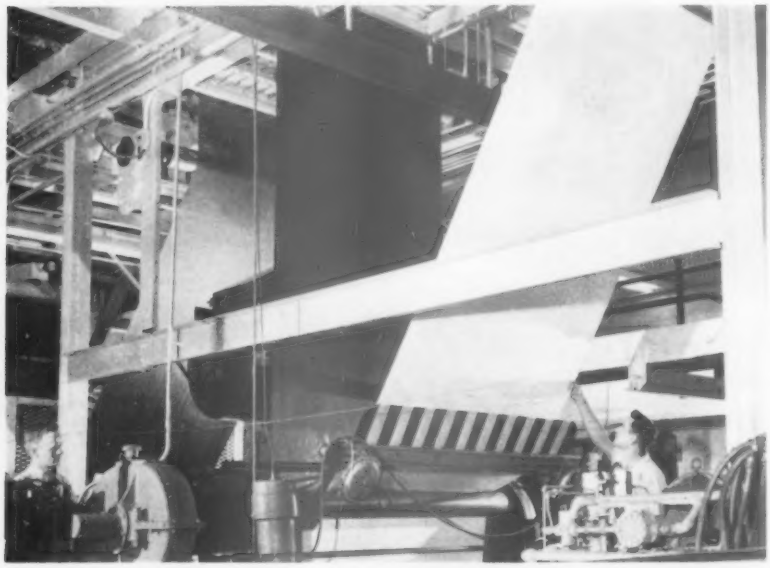
Now, Robinson is standardized on silicones. With Dow Corning 20 Compound on the molds, production is up, mold maintenance is virtually eliminated and products exceed quality and appearance requirements. The silicone coating is brushed on only once a day. And one application releases from 50 to 200 parts.

When you're stuck with a mold sticking problem — or better yet, *before* you are — check into Dow Corning Silicones. *No. 748*

FOAM'S FUNERAL

Plant production men keep foam under control — never let it get away with all the trouble it could cause. But there is still the question: "How can it be stopped faster, more effectively and at lower cost?" Here's one answer:

In processing shelled peas and lima beans, Producers Service Corp., Benton Harbor, Mich., must keep foam down. If foam gets out of hand, the peas and beans float right out of the graders. Another reason for keeping foam at bay: If foam takes over, it's necessary to *(Cont. Pg. 2)*



CURE FOR HEAT TROUBLES

Somewhere in almost every plant there's a bearing or some other moving part that gets too hot. Ordinary lubricants gum up or drip away and the bearing fails. Now there are oils and greases that won't gum . . . moving parts keep running. Witness this proof:

Like many other modern processing machines, the nylon treater at the Firestone Textiles plant in Gastonia, N. C. is huge, complex, and costly . . . often runs hot. It must pay for itself by operating constantly . . . around the clock. Any unscheduled stoppage costs big money. Ever since the treater was installed, some of its bearings — those in the quick-cooling fan — have been lubricated with Dow Corning 41 Grease and 710 R Fluid, both silicone materials. These bearings have always performed faultlessly, though constantly subjected to 350 F and occasionally to as much as 450 F. But a $5\frac{7}{16}$" roller bearing in the "turnabout" pillow block *did* fail. It was not silicone lubricated.

Firestone switched to Dow Corning Silicones in the pillow block, too. Results? They haven't had a failure since. Obviously, the story has a moral: When you have high temperature troubles with lubricants, send for a non-gumming Dow Corning silicone oil or grease. *No. 750*

DEFOAMER *(Continued)*

change the brine and that requires 14 bags of salt and 2 hours of labor.

Producers Service controls foam completely with a Dow Corning silicone defoamer. Five ounces of silicone emulsion prevent foam in the grader that handles 15 tons of peas per day. Foam can be much more severe in lima bean processing. Here only 20 ounces of water-dilutable silicone defoamer emulsion stop foam in 10 tons of shelled beans.

Which defoamer is the most effective? The one you're using may be doing a good job, but it may be possible to get even faster, more economical foam-killing action. Why not test Dow Corning silicone defoamers in your plant? They're safe, heat-stable, fast-acting, easy to use. That's why they are first choice in so many industries. *No. 749*

new literature and technical data on silicones

Surface-Maintenance Money Saver — Silicone-based paints provide up to 200% longer service life — greater protection. This brochure contains a new paint selector for choosing the best type of paint for every application . . . features case histories of equipment kept rust-free and attractive longer. Superior weathering properties, heat stability and resistance to corrosion are inherent characteristics of paints formulated with Dow Corning silicone resins. . . . *No. 751*

Pneumatic Grease Meets Specifications — Dow Corning 55 Pneumatic Grease is designed for dynamic lubrication between rubber and metal parts, between some bearing metals. Especially devised for aircraft pneumatic systems, 55 Grease meets the requirements of Specification MIL-L-4343A, Amendment No. 1. The wide temperature range and oxidation resistance of this silicone grease are discussed in . . *No. 752*

What, Why and Where — The full story on electric motors rewound with Dow Corning Silicones is told in this 4-page data sheet. A summary of what silicone insulation is, the benefits it offers, and an up-to-date listing of Dow Corning Authorized Service Shops are contained in this valuable data sheet . . . . *No. 753*

Ready-To-Use — Now a single component room temperature vulcanizing silicone rubber has been developed by Dow Corning. It is available for immediate application . . . for patching, sealing, and other maintenance jobs. Reacting to moisture in the air, Silastic RTV 731 cures at room temperature to a solid rubbery form. This data sheet gives details . . . . . *No. 754*

Forms, Properties, and Applications of Dow Corning Silicones are well-illustrated and supplemented with tables and graphs in the new guide to Dow Corning products. This 16-page reference covers production and maintenance materials that resist time, heat, cold, moisture, weathering, oxidation, and chemical attack. You might find the solution to your problems by writing for . . . . . *No. 755*

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Here's a guessing contest for lamp users. It's a fun way for General Electric to demonstrate this very important point: *Whatever type of fluorescent you use, General Electric research has produced a lamp that will give you more light for your money.* To underscore the point, we are using our most dramatic new fluorescent, the mighty G-E Power Groove* Lamp.

TOP 25 WINNERS will receive a handsome matched ensemble of decorator-approved lamps for the home—including:

- One swing arm desk lamp
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- One floor lamp
- 12 feet of fluorescent lighting for valances or cornices

All lamps with beautiful matching shades

NEXT 500 WINNERS will win powerful G-E PAR outdoor spotlights with water-proofed socket and 25 feet of cord.

HERE'S ALL YOU NEED TO KNOW TO WIN:

- G-E Power Groove Lamp Fact No. 1—users save from $15 to $85 per lamp on initial installation costs over previous fluorescent types.
- G-E Power Groove Lamp Fact No. 2—The lamp is by far the most popular and successful high intensity fluorescent on the market today.

At this point you become an armchair economist. Just make a guess at how many initial investment dollars *all* G-E Power Groove Lamp users *will save* between June 1, 1959, and June 1, 1960. (We won't have our final estimate until after June 1, 1960, so your guess is as good as anybody's. But here's a tip: We think it will be between 12 and 18 million dollars!)

NOTHING TO BUY . . . NOTHING TO LOSE— Enter now! Get your entry blank and any further information you might need from your G-E Lamp distributor.

General Electric Co., Large Lamp Dept. C-012, Nela Park, Cleveland 12, Ohio.

*General Electric trademark for its non-circular cross section fluorescent lamp.

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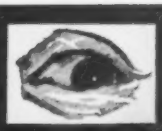

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Branches in principal cities • IN CANADA: 5621-23 Casgrain Ave., Montreal

WEST

For more facts Circle 538 on Reader Service Card

Heavy-duty Badger water meters

maintain high accuracy . . . low pressure loss

These precision-built Badger meters are designed for heavy industrial service.

Disc meters are available from ⅝" to 2"; turbine meters, from 2" to 12" inclusive. 2" stainless steel oscillating piston models also available. All handle flows to 212° F.

Typical applications: Batching meters for chemical and fertilizer plants; interdepartmental metering; regulation of water treatment. Electric alarm, electric contacting and remote reading registers are offered as accessories.

Write for descriptive literature

Badger Meter Mfg. Co.
Industrial Products Div. • Milwaukee 23, Wis.

Begins on page 228

of pay for all hours worked outside of his regularly scheduled hours with a minimum of pay of three hours at one and one-half times his regular straight-time hourly rate of pay."

The company called in workers for a half hour before their regular shift to explain why their present superintendent was let go and who the new one would be. The company paid time and one-half (overtime) for the half hour only. The union claimed the three-hour minimum call-in pay. Arbitrator Logan studied the clause and sided with the union. The language was express and clear. He refused to consider a handbook previously used by the company as its bible of employee relations and related past practice. In this case, the handbook was superseded by the contract, ruled Logan.

Who's Liable?

Insurance companies may have to take their inspection services more seriously—or cut them out entirely.

Workmen's compensation insurance carriers play up their safety inspection services in trying to outbid competitors for plant coverage. And once the carrier is selected, the wise plant executive will follow their recommendations for a safer plant. Carrier safety inspection is important to plant operations.

But a recent pacemaking Illinois court decision gave it a new importance—something beyond the wildest imagination and desire of any insurance company. The decision stated that the American Mutual Liability of Boston was liable in a construction accident, because it volunteered to make safety inspections and was negligent in overlooking recommendations about defects that led to a hoist killing or injuring 19 workmen. The company was ordered to pay $1,569,400 in damages.

If this decision holds up on appeal, insurance carriers will either stop making recommendations or throw the book at plant safety supervisors. Furthermore, other insurance carriers such as the boiler explosion insurers, will have to take a position, since a large portion of their premiums is for inspection service.

For more facts Circle 539 on Reader Service Card

EASY DOES IT ALL THE WAY

EASY to set up. A closed unit of Hallowell Erectomatic steel shelving can be set up by two men in just over 10 minutes. Typical of installations that can save you as much as 40% in erection time.

EASY to arrange stocks. Erectomatic shelves are *individually* adjustable to changing size loads. Exclusive beaded front post construction makes full use of the entire shelf width.

EASY to change shelf positions. Shelves slide straight in, straight out. Exclusive locking device holds shelf in position. No tilting, no unloading, no disturbing adjacent shelves.

EASY to add accessories. Label holders, bin fronts, dividers, and many other accessories can be pre-assembled to shelf. Entire unit slides quickly into place.

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ERECTOMATIC® SHELVING

Mail coupon for FREE catalog today!

And look at these outstanding PLUS features:

- Full-depth shelf supports prevent buckling
- 4 classes of shelves meet all load requirements
- Usable storage space increased by as much as 20%
- Independent shelf positioning
- Choice of open or closed shelving; bin or ledge units; counters or cabinets
- A wide range of baked enamel colors on prime, phosphate coated steel

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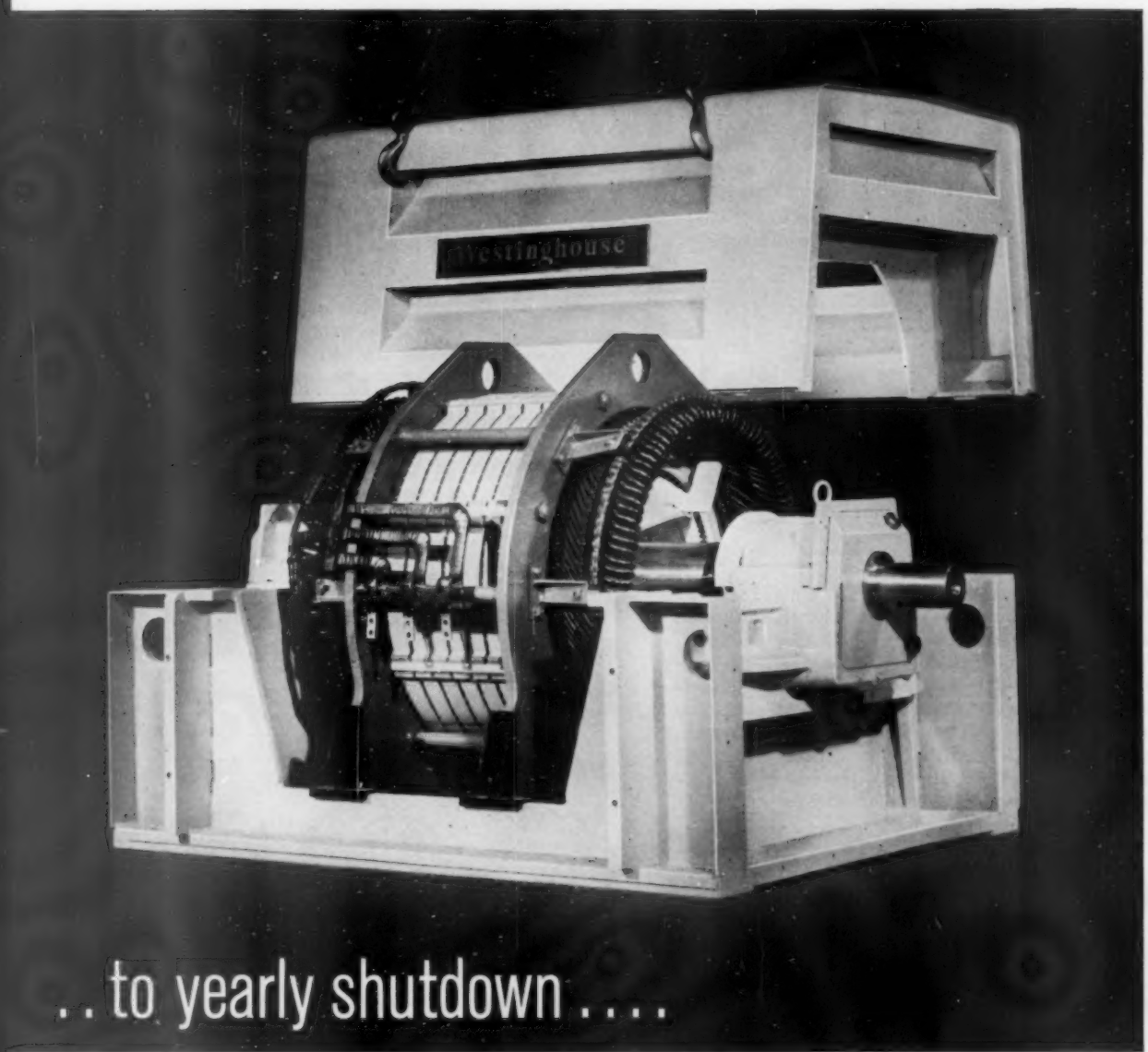
the F/A Motor saves you time and money!

Scheduled inspections and cleanings that result in longer life for your large motors are now easier, less expensive and—for the first time—accomplished with motor parts in *full view!*

The Westinghouse F/A Motor can be prepared for routine inspection, examined, and be back in operation in 10 minutes. For planned yearly inspections, complete disassembly and reassembly take only an hour.

Routine or Weekly Inspection. It takes just three minutes to prepare for this inspection. Merely removing the side panel completely exposes the leads, winding ends and rotor air ducts. A quick cleaning takes care of any contaminants. In four minutes the side panel is back on, and the F/A Motor is in operation.

Detailed Annual Inspection. Such a complete disassembly as is shown at the right, above, is rarely done, because in conventional motors it is virtually impossible. However, with the Westinghouse F/A Motor it *can* be done, and in just half an hour! No other housing design permits such



.. to yearly shutdown ....

see-ability and accessibility. Here you can *completely* check windings and bracing, examine the ends of the rotor, check the condition of the *total* core and check all bolts for security. Necessary cleaning can be done in minutes, and with a thoroughness heretofore impossible. Then, in roughly 30 minutes, reassembly of side panels, top air shields, end covers and top enclosure puts the F/A Motor back "on the line."

For full information on the long service life, reliability and accessibility of the Westinghouse F/A Motor, call your Westinghouse representative or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-15003

CHECK THESE BONUS VALUES IN THE F/A MOTOR

- Full Accessibility
- Inherently Quiet—housing and stator separated
- Thermalastic® Insulation—recognized as the finest
- Time-Proven Components—longer, more efficient life
- Easy Connection—conduit boxes eliminated

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS

Take Five to Pass the Basket

The office collection has gone (or come) the way of the coffee break. It's an established institution in 71% of the 200 companies polled by *Industrial Relations News*, New York. These companies permit private fund raising by employees for events such as weddings and birthdays. Baseball pools and other minor forms of gambling are not discouraged, either. And to keep the rules of the game fair, some companies officially pass the basket to regulate frequency and manner of collection.

Unions Thrown Off Ivory Tower

Once upon a time labor was the fairhaired boy of the intellectual. But since World War II, unions have suffered heavy losses in their egghead support. So has liberalism as a philosophy.

Dr. George Odiorne, University of Michigan, at a U-M industrial relations conference (Grand Rapids) claimed that unions may come under increasing attack from the eggheads in 1960. Nowadays, he said, a professor is more easily aroused by the plight of the gray flannel suit than that of "the horny-handed son of toil." Reason: The worker lives in a better house, drives a fancier car than the professor.

Management has also come in for some recent comment. At a session of Xavier Institute of Industrial Relations (N.Y.), Secretary of Labor James P. Mitchell pointed out the growing responsibility shared by labor and management. He stressed that both must subordinate personal self-gain for the good of total society. And offered these guides for labor-management relations:

(1) No single interest has the right to endanger the general interest. (2) No institution or combination of institutions can derive its own welfare from a loss to society. (3) Any private institution, corporation, or union that involves the public welfare has a public responsibility.

Service Awards "Sparkle Plenty"

Westinghouse Electric Corporation (Pittsburgh) no longer has the problem of squirreled-away service awards. Employees now wear them proudly. Instead of receiving the standard service button, they can choose their own awards from a wide selection of jewelry.

The material used in the jewelry (sterling silver or gold-filled) and the addition of a star, sapphire, ruby, or diamond, designates an employee's years of service. A man may choose a tie slide, tie tack, cuff links, belt buckle, money clip, key charm, and key protector. A woman employee has the choice of pin, earrings, sweater guard, key charm, bracelet, necklace, and key protector.

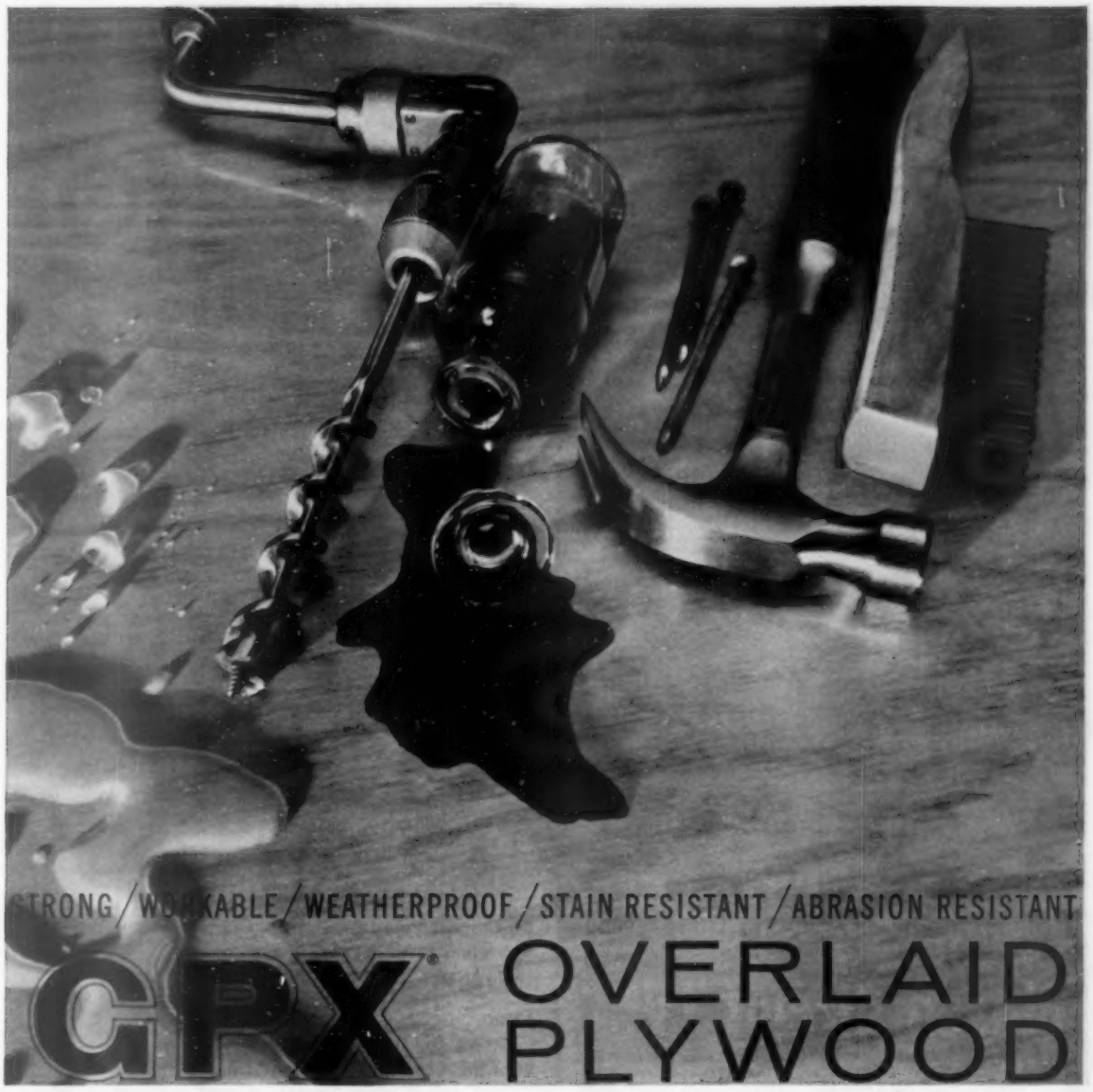
After 35 years' service, precious jewels are set in the award—starting with a sapphire. Five years later, it's a ruby; 10 years later, a 6-point diamond; and for golden anniversaries, a 9-point diamond. The jewelry motif is a leaf design framing the company's "W" trademark.

There's Pep in the Old Boy Yet

More evidence is piling up to support the ability of the older worker. Recent U. S. Department of Labor studies find that output per man-hour shows no significant drop until after age 55, and then only a small decline. Also, older workers possess a high degree of stability—they're not job hoppers.

Despite these findings, from a sampling of 500 workers out of 4000 laid off by Packard Motor Company, Detroit, age was found to be a major barrier to re-employment. A report, published by the U. S. Senate Subcommittee on Unemployment Insurance, shows that two-thirds of this group had over 23 years' seniority at Packard. Of these, 95% were 40 or older. Two years after the plant closed in June 1956, 44% of the workers had found another job. Over 22% were still unemployed at the time of the report.

Turn the page



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Georgia-Pacific's high density GPX is high-grade exterior plywood with an armor-hard, resin-fiber overlay on one or both sides. Resists abrasion, chemicals, surface checking and extreme temperature changes. Available in standard thickness and panel sizes or custom-sized to order.

How can GPX help in **your** plant? Send this coupon for sample and specifications to: Georgia-Pacific, Dept. F 460, Equitable Building, Portland, Oregon. Or call your local G.P. source.

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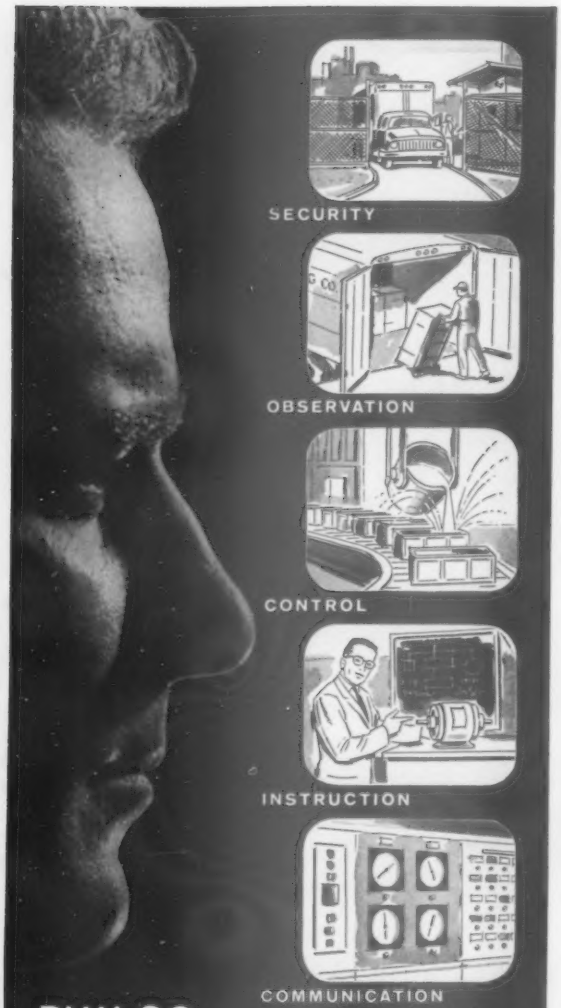

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Provides greatest flexibility . . . utility . . . economy

If you are considering CCTV in *your* plant, it will pay you to consult Philco . . . pioneer in all-transistor closed circuit TV. Philco equipment is engineered for complete reliability and freedom from maintenance. It is as easy to operate as your home TV. Write for information and your copy of the Philco Guide to TV in Industry.

Government & Industrial Group

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PHILCO®

Famous for Quality the World Over

Begins on page 244

Crystal Ball for Managers

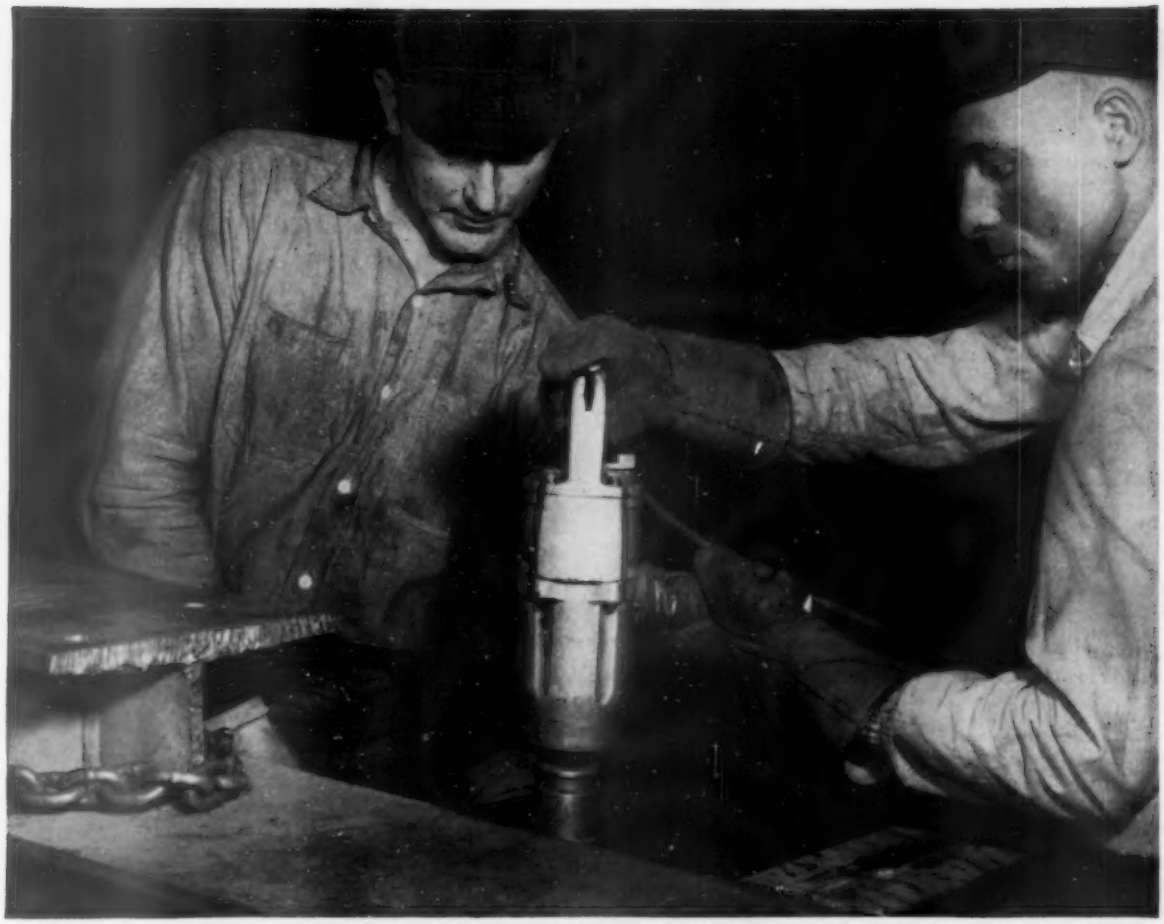
Advance planning may not turn your workday into a picnic, but it will make life at the plant run smoother, claims a recent issue of *Rough Notes* (Indianapolis). You can devise your own crystal ball by taking 10 minutes before quitting time to draw up a work plan for the next day. Try to foresee any problems that could arise. Consider the following eight steps that can lead to a carefree productive day:

1. Avoid unpleasant stack-ups. By spacing out "must do" chores, you'll avoid tackling all the distasteful ones on any one day.
2. Avoid dull stretches. Schedule routine jobs so they don't run into each other too frequently.
3. Get troublemakers out of the way. Don't put off the unpleasant jobs, but tackle them first in the day's schedule.
4. Spread out the "peaks." They're sometimes unavoidable, but the tension you build up cuts your efficiency.
5. Get others to help. Delegate work to solve tough problems. Often two heads are better than one—and faster.
6. Update procedures. Review your way of doing a job. There may be a faster, easier method to handle a complex operation.
7. Minimize outside interference. Be firm about allowing only important interruptions.
8. Control your temper. Count ten before letting small irritations explode into major catastrophes. Blow-ups only increase tension, can disrupt an entire day.

Diploma is Job Ticket

There's no shortage of jobs—just of qualified people, says the U. S. Department of Labor. Seven out of eight 1959 high school graduates had jobs by last October. Those that dropped out of school before graduation had a rate of unemployment double that of graduates. Of the employed graduates, 50% held clerical, office, and sales jobs, compared with only 6% of the drop-outs. A higher per cent of the drop-outs (44%) held lower paying and laborer jobs as against 18% of the graduates.

Turn the page



Field reports prove that the powerful, new Gardner-Denver impact mechanism hits harder—yet doesn't wear itself out. See for yourself.

New Gardner-Denver impact wrenches hit harder . . . last longer

TIME TO TALK COST SAVING

When you keep in touch with your Gardner-Denver air tool specialist, you keep in touch with the latest developments in new methods and machines to cut costs. At Gardner-Denver, there's no substitute for men—our growth philosophy as we enter our second century of service.

Now get efficient impacting for maintenance, production, plant construction, etc., with two new impact wrenches that hit harder—yet don't wear themselves out. They're the result of intensive Gardner-Denver engineering to develop a powerful, long-lasting impact mechanism. The combination of a fast-accelerating air motor and a new, patented clutch mechanism assures powerful, efficient impacting and lowest maintenance.

And look at these advantages: light weight—lowest weight possible consistent with high power output . . . ease of disassembly for service . . . no torque reaction . . . reversing lever protected from accidental engagement, but readily accessible when needed.

Two models available: Model 18-B-9 with 1¼" rated bolt capacity . . . Model 18-B-7 with ¾" rated bolt capacity. Get all the details from your Gardner-Denver air tool specialist or write for Bulletins 18-15 and 18-11.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

For more facts Circle 544 on Reader Service Card

water

comes in oceans, rivers, lakes, wells,
drops, buckets, pitchers and glasses.
it quenches thirsts, cooks food, puts
out fires, makes coffee and
brushes teeth. it spins mills,
runs electro-plants, cools motors
and power factories.
it spawns fish, sprinkles lawns,
floats boats, washes children
and grows flowers.

it sustains and nurtures.
it bends if you give it purpose.
it reshapes itself if you give it reason.
it is needed, wanted, feared,
praised and prayed for.

it is at the heart of all life.
it is in the arteries of all industry.
it is as close to us as skin
but as taken for granted as sky.

the end of water seems unbelievable.
if it is not on the horizon, it is just over it.
if it is not within sight,
it is just 'round the bend.
if it is not in the glass,
it is just in the spigot.

. . . this is the grand mirage . . .
the self-delusion that prevails
though the wells run low
and the streams go dry
and the water slips away.

we know water.
we know its ways.
we've learned its habits.
we've pulled it out of swamplands,
pushed it over mountains,
pumped it into deserts,
tunneled it through granite,
and rescued it from pollution.

above all else,
we know the need for it.
that is why,
for 130 years,
we've developed new uses for,
powered new factories with,
diverted the courses of
and jealously stood guard over
water.

Fairbanks, Morse

A MAJOR INDUSTRIAL COMPONENT OF FAIRBANKS WHITNEY CORPORATION, NEW YORK

No other manufacturer makes pumps for such a variety of hydraulic applications as Fairbanks, Morse. If it's liquid . . . if it flows . . . we make the pumps that move it . . . at low cost per gallon . . . in sizes from 200 gph to 800,000 gpm, and to 3000 psi . . . for every industrial need.

Our pumps . . . our generators and controls . . . our new rotary compressors . . . our drive toward better ways to de-salt ocean water . . . the potential of our advance Research & Development Center in Beloit . . . our lead position in the field of Hydrodynamics . . . all of these equip us to serve you.

Send for our brochure—"Hydrodynamics." Please write to Mr. Robert W. Kerr, President, Fairbanks, Morse & Company, 600 South Michigan Ave., Chicago 5, Illinois.

Begins on page 244

Every Letter a Lunch

Each business letter produced by your secretary costs an average of $1.83, or the price of a good lunch. This represents a 13¢ increase since the last survey by The Dartnell Corporation, Chicago, in 1953. Then you paid a mere $1.17 per letter. Today, if you dictate 30 letters daily over an average 22 working days a month, your yearly outlay for correspondence is $12,910. And the future doesn't look any rosier. Climbing costs of labor, material, and postage in this decade are expected to tack another few cents on today's average.

Winning Workers With Words

To further the cause of good business communications, Hewitt & Associates, management consultants of Libertyville, Ill., suggests these 10 rules to improve your program:

1. Keep message simple. And make it interesting so people will take the trouble to understand.

2. Aim it true. Make each man feel you are directing information to him alone, i.e., answering his "What's in it for me?"

3. Start early. If a new policy or program is developing, let people in on the ground floor so they know what's going on.

4. Take one step at a time. Avoid confusion by limiting information to highlights, not details.

5. Recognize people's importance. By showing the man his value in a job, your programs will take on personal importance to him.

6. Play it straight. Present both advantages and disadvantages of programs, such as those regarding employee benefits.

7. Vary the approach. Change your methods of presentation by using different channels, media, and techniques to get your story across.

8. Keep proper balance. For example, don't devote your house organ entirely to personal news. It will lift morale, but fail to satisfy your employees' need for business news.

9. Check your progress. Figure out a feedback system to gage the degree of acceptance and penetration of your message.

10. Keep it up. Changes in personnel, outlooks, interests, ages, etc., require constant repetition.

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★ Electro-formed nickel or copper MASKS for spray decorating of intricate areas in multiple colors, one wet coat after another.
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Northern Hard MAPLE
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Most modern touch you can give to a building! These bright, smooth, enduring floors of delicately-grained MFMA Northern Hard Maple bring any space up-to-date like magic. A grade for every budget—all good grades! Use MFMA Maple or Birch. They're guaranteed. Write—
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553 Pure Oil Bldg., 35 E. Wacker Drive
Chicago 1, Illinois

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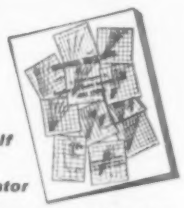
Take your own company . . . and prove how many extra $1000 of profit you can make!

We're not talking about pennies here. Electric industrial trucks can save you enough to make a big difference in your profit. And right now Exide has a plan which can show you in fairly precise dollars just how much extra profit you can earn...this year and the years ahead.

The Exide representative will come into your plant and survey your actual truck operating requirements. Using your own figures, he will show you just exactly where and how electric industrial trucks can save you money.

And they will save you money . . . through lower annual depreciation, lower operating cost, less upkeep, less downtime. Average savings are $1000 per truck per year. This has been proved in hundreds of cases. And there are operating advantages besides: no fumes, easier driving, cleaner floors, and higher productive speed.



Free do-it-yourself cost calculator

Just fill in the blanks, using figures from your own records, and you can calculate how much your present industrial trucks are costing you... and how much you can save by switching to electrics. Write Exide Industrial Division, The Electric Storage Battery Company, Phila. 20, Pa.

Exide® THE ELECTRIC STORAGE BATTERY COMPANY

WORLD'S LEADING MAKER OF INDUSTRIAL BATTERIES

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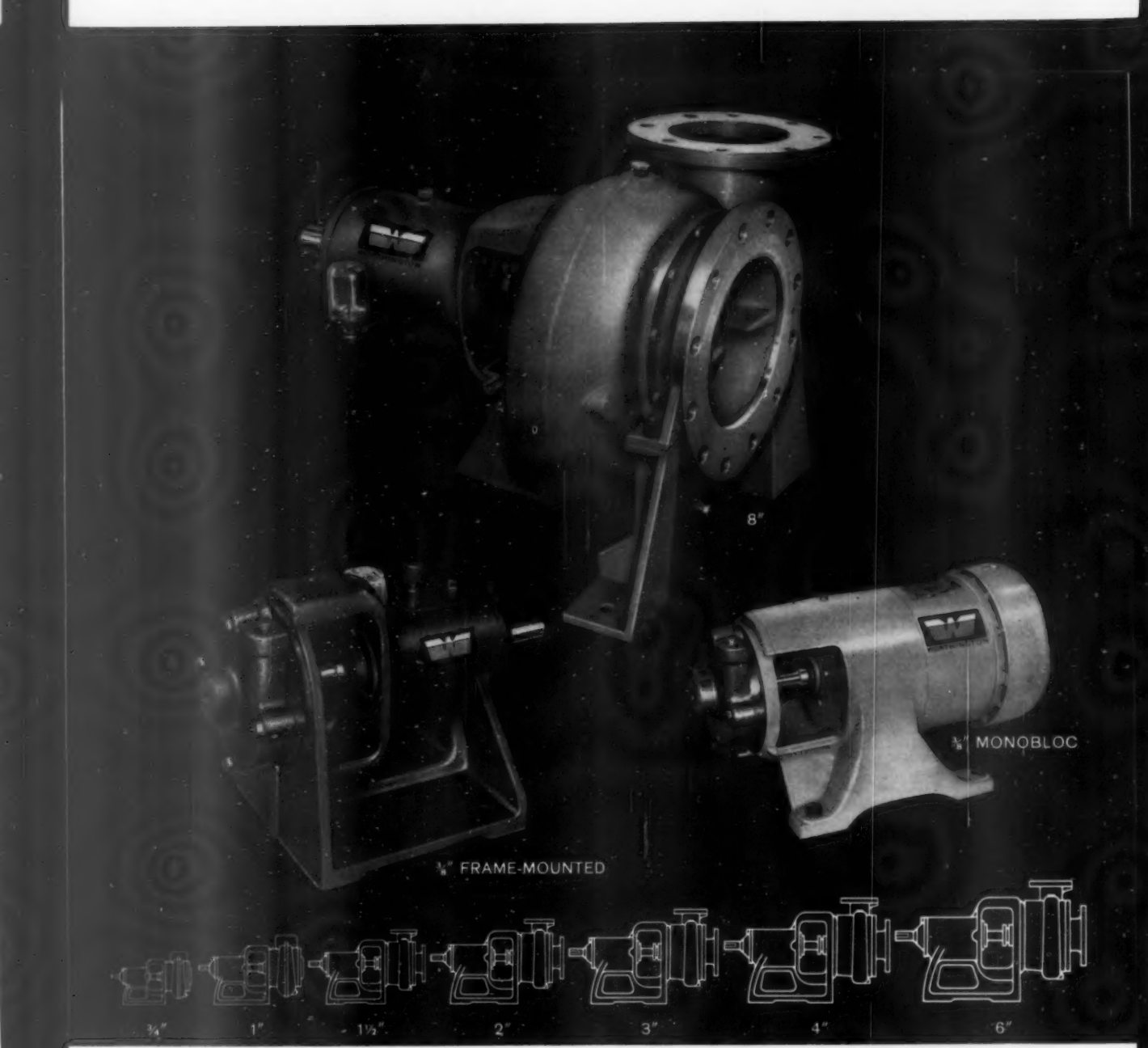


3 NEW PUMPS

make Worthite your broadest choice for corrosive applications

Worthington has recently added new pumps at the top and bottom of its Worthite* line.

These new sizes mean you can order standard Worthite centrifugal pumps in capacities up to 4000 gpm and heads up to 275 feet.

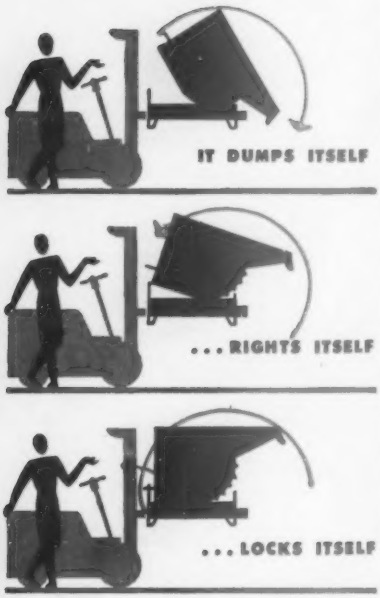
New ⅜" Pump—Available in both frame mounted and Monobloc designs, the ⅜" pump is designed for continuous, 24-hour-a-day service. The rugged frame and shaft is actually the same physical size as the larger ¾" and 1" pumps. All liquid end parts are precision cast. Oil lubricated bearings are standard (although grease lubrication is available.) In short, this pump will give long, trouble-free life and outlast 2 or 3 ordinary units.

New 8" Pump—Of different design than the rest of the line, the new 8" Worthite pump has a twin volute liquid end. A water jacket which serves to either heat or cool the stuffing box area is an integral part of the stuffing box head. The pump can be disassembled from the rear without disturbing the volute, suction head or piping. Separate supports for frame and liquid end facilitate the disassembly.

For the name of your nearest Worthington distributor consult the Yellow Pages. Or write to Worthington Corporation, Section 20-13, Harrison, New Jersey.

*Worthite is a registered tradename for a high nickel, high chromium, molybdenum alloy steel. This "super" stainless steel is available only from Worthington.

WORTHINGTON



How to cut scrap handling costs 50%

Here's the fastest, lowest cost method of scrap handling ever devised. Hundreds of industries are now using Roura Hoppers instead of barrels or tote boxes to collect scrap metal. They're placed alongside machines or in strategic locations. When full, lift truck operator picks up loaded hopper . . . transports it to scrap bin or freight car . . . flips the latch . . . and the hopper automatically dumps its load, rights itself, locks itself. Hopper is returned to its station and operator is free for other work.

Segregation of scrap is simple. Hoppers can be marked for copper, brass, stainless, etc. Brings higher prices.

Roura Hoppers are made in five sizes, ½ to 2 yard capacities. Sturdily built of 3/16" steel plate with continuous arc-welded seams. Also available in stainless steel or galvanized. Mounted on live skids or a choice of wheels. Standard models available for immediate shipment from stock.

Start cutting costs now . . . with Roura Hoppers. *Remember . . . if it's as good as a Roura it IS a Roura.*

ROURA
Self-Dumping
HOPPER

HERE'S HOW to get more details about Roura Self-Dumping Hoppers. Just attach this coupon to your letterhead . . . sign your name . . . and mail to . . .

ROURA IRON WORKS, INC.
1423 Woodland Ave., Detroit 11, Michigan

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

PRODUCTION

1—Air Gages. Catalog SPG-160 is a 50-pager that tells how to select the right amplification for a gaging job, when to use long-range air gages, and other facts. Tells principles and advantages of air gaging. *The Sheffield Corp.*

2—Multipresses. This 24-page revised bulletin (No. 120) describes applications, and cutaway drawings show why the multipress is capable of exact control of ram speeds, pressures, strokes, and actions. *American Brake Shoe Co.*

3—Power Tools. Band, contour, and jig saws; saw tables, lathes, jointers, and other tools are covered in 44-page Catalog No. 60. Illustrates new products that include 10-in. tilt arbor saw, hand-stroke belt sander, etc. *Boice-Crane Co.*

4—Elevating Feeders. Construction and dimensional details for three standard-size feeders—6-, 12-, 20-cu.-ft. holding capacity—are given in 4-pager (No. 2812). Describes controls and tooling. Photos. *Detroit Power Screwdriver Co.*

5—Machine Tools. Here's a 12-pager (No. 60) on boring, drilling, milling machines, and accessories. Lists several elephant machines as standard equipment; planer mills with head drive motors. *Giddings & Lewis Machine Tool Co.*

6—Drill Press Feeds. Catalog No. F-60 has 8 pages of information about air and hydraulic powered feeds and their tapping and drilling machines. Describes advantages such as less drill and tap breakage. *Beckett-Harcum Co.*

7—Comparators. This comprehensive catalog contains information and recommended gaging procedures covering ring-snap and roll-snap precision comparators. Includes useful section on screw thread gaging terminology. *Johnson Gage Co.*

8—Feeders. Here's a 32-pager with descriptions, data, and specifications for small, heavy and extra-heavy-duty standard electromagnetically vibrated feeders. Over 90 illustrations. *Syntron Co.*

9—Analyses Services. How scientific instruments are used to analyze materials quickly and accurately is subject of 12-page brochure. Tells how problems of control and development are solved. *Spectrochemical Laboratories, Inc.*

MAINTENANCE

10—Drilling Equipment. Catalog No. SC-6 (8 pages) describes drilling machines, drill bits and accessories, concrete, masonry and stone saws, and diamond blades. Gives hints on how to reduce drilling costs. *Wheel Trueing Tool Co.*

11—Saw Blades. Cutting problems and their solutions are covered in 36-page pocket-size handbook (No. 578). Tells how to select proper blade, correct feed, speed, tension. Lists various types and sizes of blades available. *Ladish Co.*

12—Safety Tools. Here's a revised 24-pager that tells about non-sparking safety tools and newest additions to company's line of over 400 items. Non-sparking, the tools are also non-corrosive and non-magnetic. *Ampco Metal, Inc.*

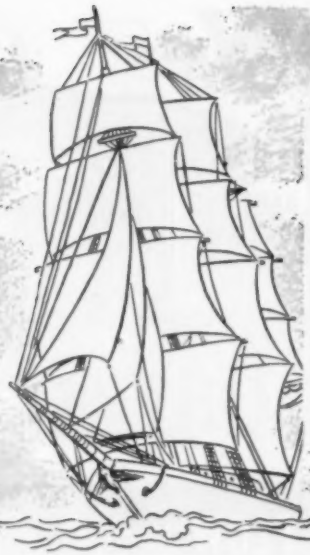
13—Hydraulic Tester. Methods for using this portable hydraulic circuit tester are described in a 4-page bulletin. Also maintenance methods to be followed when trouble-shooting hydraulic systems. *Schroeder Bros. Corp.*

14—Lubrication Systems. Information on centralized systems of lubrication is contained in Bulletin No. 26-T (24 pages). Explains advantages of systems, principles of operation, as well as system components. Photos. *Eaton Mfg. Co.*

Turn the page

Why Rust-Oleum is different—

and what this difference, backed by 35 years of industry proof, means to you!



A Sea Captain developed it . . . Industry proved it!

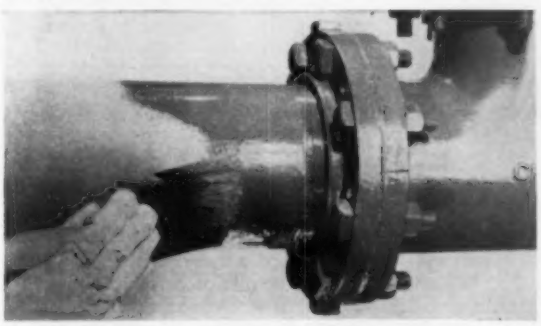
The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a *special treatment* for the fish oil, he used the *specially-processed fish oil* as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's *exclusive* 769 Damp-Proof Red Primer.

PROVED THROUGHOUT INDUSTRY FOR OVER 35 YEARS

Today, Rust-Oleum in its many systems and colors, has been proved throughout industry for over thirty-five years. This proof by leading industrial users is your assurance of savings in time, money, and metal. Economies made possible by the fact that Rust-Oleum 769 Damp-Proof Red Primer goes right over the sound rusted metal—usually eliminating costly surface preparations. And Rust-Oleum, in its various systems, resists rain, sun, fumes, heat, weathering, chemicals, etc., for lasting beauty over the years.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM

The Rust-Oleum New Color Horizons System introduces a new coating concept to industry. It combines four important factors: (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, pipes, tanks, structural steel, fences, etc. Write for complete information or contact your nearby Rust-Oleum Industrial Distributor. He maintains complete stocks for prompt service.



RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

ATTACH TO YOUR LETTERHEAD

Rust-Oleum Corporation
2518 Oakton St., Evanston, Illinois

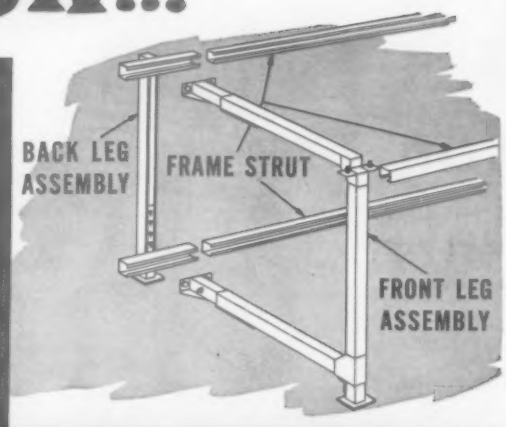
Please send me the following at no cost or obligation:

- ☐ New Color Horizons Systems Catalog featuring 110 actual color standards and 69 photo applications.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to be applied over sound rusted surface.
- ☐ Results of radioactive tracing study on Rust-Oleum fish oil penetration.

For more facts Circle 551 on Reader Service Card

NOW...

with Standard Parts...



PRODUCT-A-FLOW Modular Work Stations

...become your Custom-Planned Layouts

Free your layout planning from conventional bench limitations. Develop the layout to solve your problems of space, time and motion economy...and set it up with standard Product-A-Flow catalog parts. It's easy! Three types of telescoping members frame any configuration and form many modular accessories. Other modular accessories include shelving, lighting, conveyors, circuitry, piping...and there are drawers, pocketbook holders, etc. All elements positioned where wanted.

Product-A-Flow layouts are readily modified or completely reassembled to meet changing requirements. Exchangeable liftout tops palletize your operation... simply move them with jigs and fixtures attached. You save your investment in benches over and over. Get full details. Send for bulletin 158.

PRODUCT A FLOW

PRODUCTS FOR INDUSTRY

1530 Summer Street • Stamford, Connecticut

REPRESENTATIVES IN PRINCIPAL CITIES

FREE
Send for
Bulletin 158

FACTORY / CATALOG NEWS

Begins on page 252

For more about these items, circle item numbers on Reader Service Card next to back cover.

AUXILIARY

15—Air-Cooled Condensers. Bulletin AC-102 (12 pages) describes construction features, including the Turbo-Flo design for finned coils. Coil and fan data, capacities in Btu./hr. at the evaporator, other details. *Halstead & Mitchell.*

16—Air Compressors. Information on package design, components, intercooling, lubrication, and accessories is given in 24-page catalog (A-72). Gives specifications for three models of semi-radially constructed units. *Joy Mfg. Co.*

17—Centrifugal Pumps. Bulletin No. 130 gives sizes, performance, electrical characteristics, specifications, selection, and other details. Covers single-stage pumps, volute-type units, and multi-stage units. *Eastern Industries.*

18—Filters. "Complete Filtration for Liquids and Gases" is an illustrated 8-pager (GEO-506A). Describes filters for continuous microclarity of all types of fluids—chemicals, gases, oils, water. *Commercial Filters Corp.*

19—Scrubbers, Cyclones. Here's a 12-page bulletin (No. 4R) that discusses equipment for economical control of fumes, gases, vapor, dusts. Tables of gas handling capacities for different water pressures, etc. *Schutte and Koerting Co.*

20—Radial Compressors. Capacity ratings, condenser data, schematics, and roughing-in dimensions are given in this 40-page radial data book (Form ME-120). Describes and illustrates line's exclusive features. *Chrysler Corp.*

21—Air Distribution Units. Catalog HV-70 has 24 pages of application and performance data for all-air high-velocity Anemostat units. Includes dimensional drawings, tables, cfm. capacity, static pressure. *Anemostat Corp. of America.*

Turn to page 258

For more facts Circle 552 on Reader Service Card

For more facts Circle 553 on Reader Service Card➤

Allen-Bradley offers the

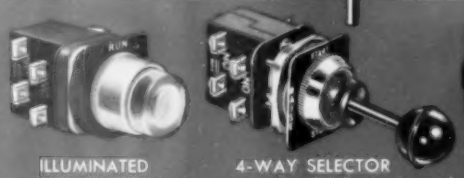
MOST COMPLETE LINE

of oiltight heavy-duty

CONTROL UNITS

The wide selection of Allen-Bradley Bulletin 800T push buttons and control units will enable you to satisfy each and every control station requirement. A-B control units and stations have seals to exclude oils and cutting fluids—contacts cannot become fouled. And *all* control units have the popular A-B double break, silver contacts that assure reliable operation—without maintenance. The rugged construction, flexibility, and generous wiring room of Allen-Bradley's Bulletin 800T line are "bonus" features. To get the best in every way—insist on Allen-Bradley. Send for Publication 6090, today.

Soft Rubber Boots Prevent Injury to men or machines. A-B pendant stations are available with from 2 to 16 units, plus emergency stop unit in bottom of enclosure.



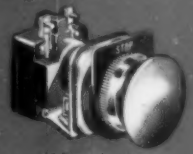
ILLUMINATED PUSH BUTTON
Space-saving two-in-one control unit.

4-WAY SELECTOR SWITCH
Can also be furnished for 2-way operation.

ENCAPSULATED PILOT LIGHT
Transformer type for rugged 6-volt bulb.

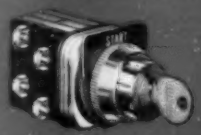
PUSH-TO-TEST
Six different color lenses available.

SELECTOR SWITCH
With coin slot operator. Other operators available.



TIME DELAY
Delay adjustable from 0.5 to 5 seconds.

POTENTIOMETER UNIT
Furnished in 2- or 5-watt capacity ratings.



LOCK TYPE
For selector switch or push button operation.

DOUBLE CIRCUIT
Has 2 N.O. or 2 N.C. sets of contacts.

16 UNIT STATION
in die-cast aluminum enclosure. Sheet metal cabinets also available for up to 25 control units.

A-AD-8M

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Yes, Allen-Bradley also makes...

A-B QUALITY

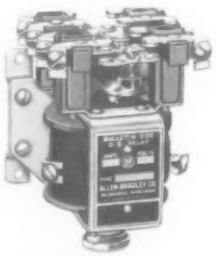
DC Contactors

Here's the only line of DC contactors using the simple solenoid design—with ONE moving part—in all ratings through Size 4. And their double break, silver alloy contacts never need servicing.

BULLETIN 202

DC Control Relays

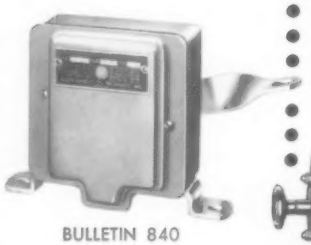
These relays are the counterpart of the Bulletin 700 line of AC relays—of which millions are in service. With only ONE moving part—these relays provide the ultimate in long life and reliability. Like the AC line, they have double break, silver contacts that never need maintenance. Made in a variety of types and with up to 8 switching poles.



BULLETIN 200

Float Switches

This versatile line of float switches is available in a wide range of types and enclosures to handle practically every industrial pumping job. They all feature a snap-action switch mechanism for positive operation no matter how slowly the liquid level changes.

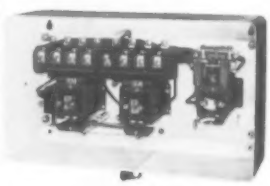


BULLETIN 840

BULLETIN 1209

Loom Switch

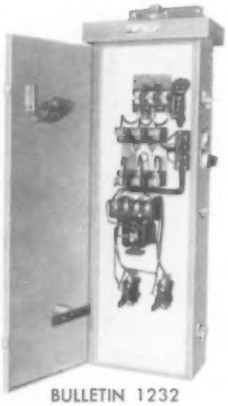
Manual starting switches designed for textile loom service. Design of operating lever makes accidental operation impossible. Lint-tight enclosure eliminates fire hazard.



BULLETIN 1270

Automatic Transfer Switches

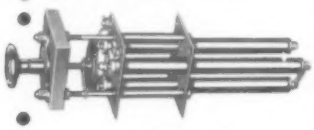
For use where power must be maintained, these panels automatically transfer the load to an auxiliary supply when normal supply fails or falls too low. Transfers automatically when the normal power supply is resumed. Mechanically interlocked.



BULLETIN 1232

Pump Control Panels

Designed for irrigation and oil field pumping applications. Can also be used with outdoor lighting systems. Uses standard A-B Bulletin 709 solenoid starter with manual disconnect switch or circuit breaker in weatherproof enclosure. Available with many optional features.



BULLETIN 410

AC and DC Rheostats

Provide absolutely stepless control over a wide resistance range. Full wattage capacity available at all settings. Sizes to 5400 watts.

6-60-RM

ALLEN-BRADLEY

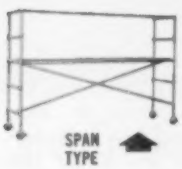
Member of NEMA

Quality **Motor Control**

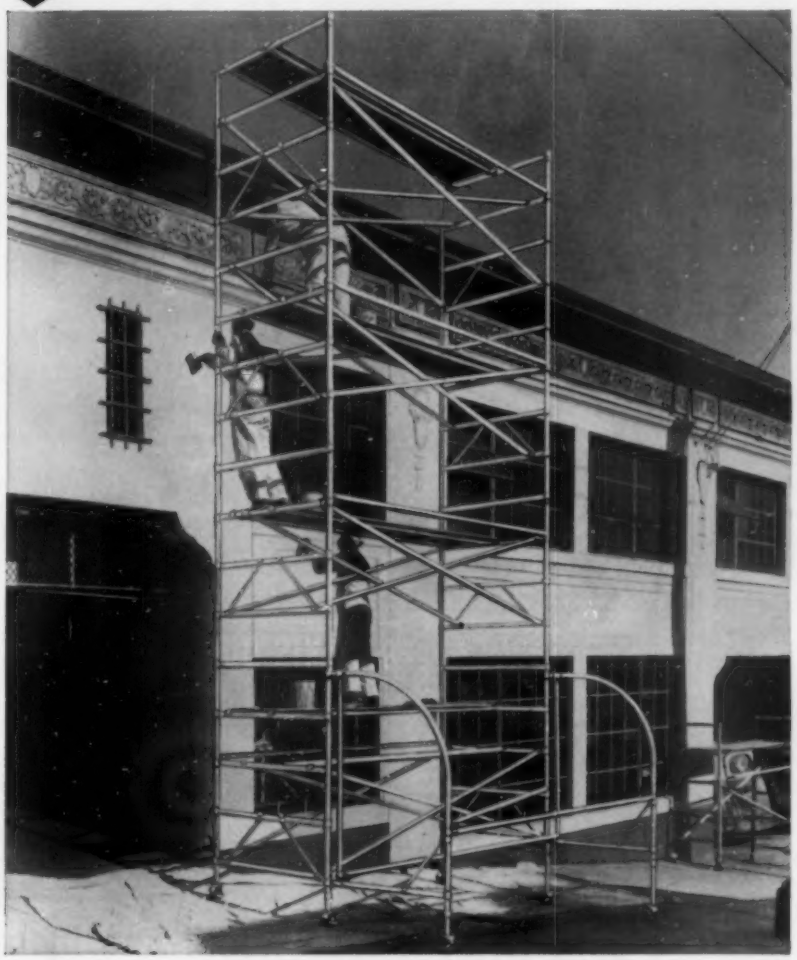
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

6 MONTH PAINTING JOB CUT TO 4 MONTHS

Up-Right aluminum scaffold-on-wheels gets men up in the air fast...lets them finish the job fast! Lightweight and quickly assembled without tools or loose parts, Up-Right scaffolds are adjustable to provide a safe, convenient working platform at any desired height. In 3 basic types for overhead installation and maintenance.



HERE'S HOW INDUSTRY SAVES ON OVERHEAD MAINTENANCE WITH NEW ALUMINUM SCAFFOLD



5,000,000 square feet of building exteriors at Texas plant were painted from Up-Right rolling aluminum scaffolding at one-third savings in cost and time compared with conventional fixed scaffolding. The 2-story exteriors were painted progressively in sections—each section worked from a span scaffold measuring 10 feet long and 16 feet high. 5 sets of aluminum scaffolds were used on this 4-month project. Lightweight and rapidly assembled, the scaffolds were rolled with the job without disassembly.

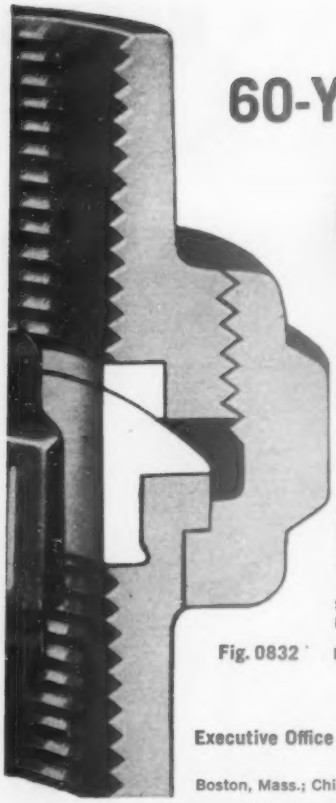
Write for descriptive circulars

UP-RIGHT SCAFFOLDS

DEPT. 178, 1013 PARDEE, BERKELEY, CALIFORNIA

In Canada: Up-Right Scaffolds, Ltd., 120 Russet Ave., Oshawa, Ontario

For more facts Circle 554 on Reader Service Card



60-Year Guarantee Backs Dart Unions

For over 60 years every Dart Union has been backed by the firm GUARANTEE that "if one should leak through, we will give you two". Less than 1 in every 100,000 has proven faulty.

The extra wide bronze seats, ground on specially designed machines to a true ball and socket joint, are swaged under heavy pressure into air-refined malleable iron bodies. They come apart readily and remake repeatedly without excessive wrenching — without jamming. They are the reason that Darts may be used over and over again.

Sizes: ⅛" thru 4 inches
Pressure ratings: ⅛"-2"— 300 S.W.P., 600 W.O.G.
2½"-4"— 250 S.W.P., 600 W.O.G.

Fig. 0832 Darts also available in the all-iron construction.

THE **Fairbanks** COMPANY
Executive Office: 393 Lafayette Street, New York 3, New York
Branch Offices:
Boston, Mass.; Chicago, Ill.; New York, N.Y.; Pittsburgh, Pa.; Rome, Ga.

For more facts Circle 555 on Reader Service Card

Send for FREE SAMPLE of "SAFETY-WALK"

amazing non-slip surfacing material

MAKE YOUR FACTORY SAFER with "SAFETY-WALK": gives perfect traction, sure footing, even under water, oil, or grease! Strips, tiles, cleats, apply in minutes . . . last for years. Four colors . . . easy to keep clean. For stairs, walkways, ramps, indoors and out. Pays off in accident prevention; prevents costly claims; improves employee efficiency.

"SAFETY-WALK" is a registered trademark of 3M Co., St. Paul 6, Minn.

Minnesota Mining and Mfg. Co.,
St. Paul 6, Minn., Dept. AAE-40

Please send me a free sample of "SAFETY-WALK" and complete information.

NAME_____
TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

SAFETY-WALK BRAND **Non-Slip Surfacing**

MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW
3M COMPANY

FACTORY / CATALOG NEWS

Begins on page 252

For more about these items, circle item numbers on Reader Service Card next to back cover.

22—Magnetic Pulleys. Factors governing the selection of electromagnetic pulleys or non-electric ceramic-type Perma-pulleys are explained in Catalog C-2000 (8 pages). *Dings Magnetic Separator Co.*

23—Dust Control Equipment. "Freedom from Dust" is a 28-page brochure (No. 805) on dry collection equipment. Data shows how equipment is used to collect waste dust or return re-usable material to manufacturing process. *Fuller Co.*

MECHANICAL

24—Gear Units. Here's a 6-page catalog (No. 5912) on design improvements in company's right-angle power transfer line. Gives features of 17 new models. "Packaged" units come in two- or three-way designs. *Crown Gear, Inc.*

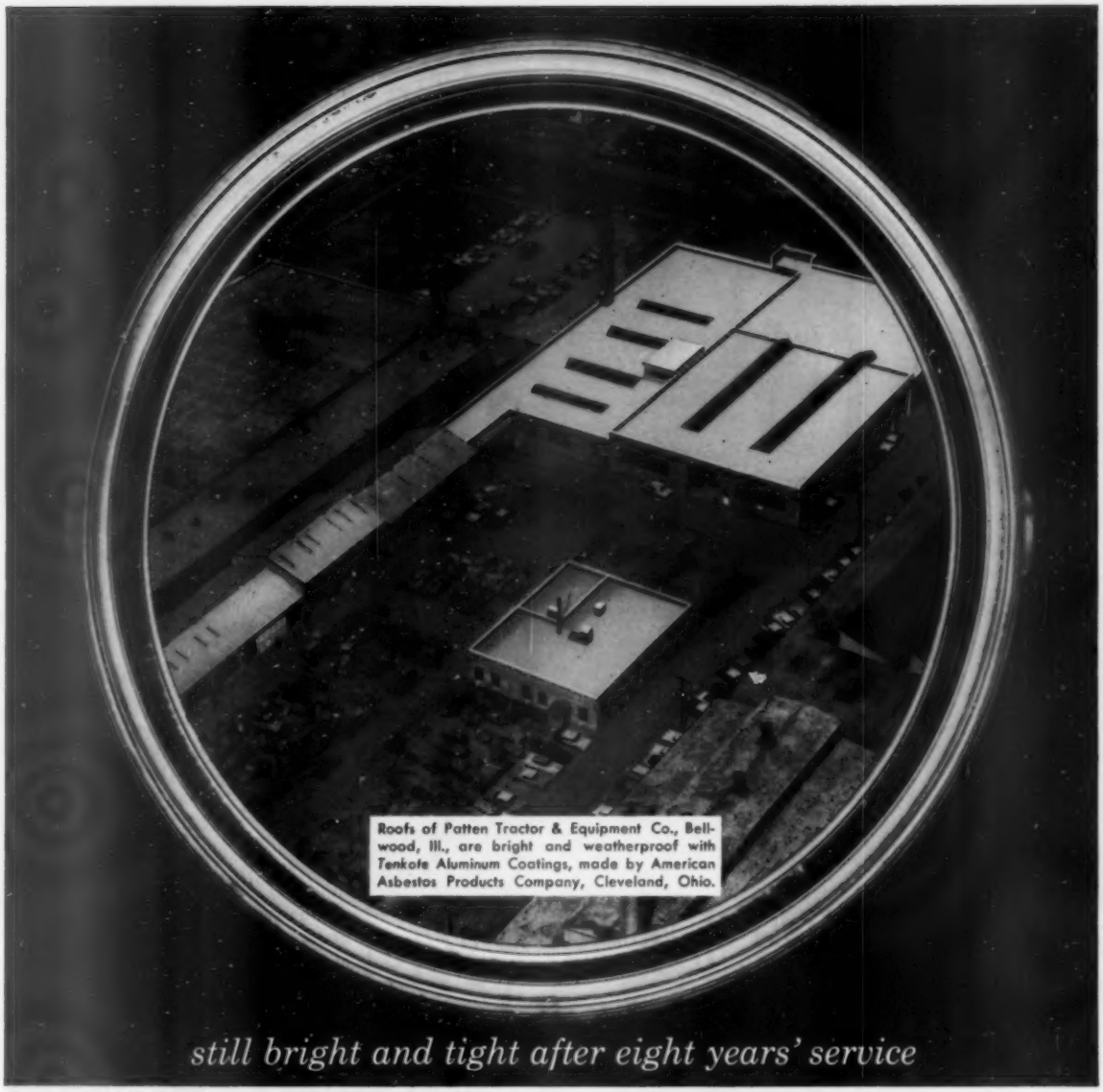
25—Bearing Units. Catalog BU-103A (20 pages) describes tapered roller bearing flange blocks (shaft sizes $1\frac{3}{16}$ to $2\frac{15}{16}$ in.) that have been added to company's 900 Series of pillow blocks. Comparison, rating charts. *Browning Mfg. Co.*

26—Cylinders and Circuits. Three cylinders and several flange mounting styles, boosters, and pipe thread fittings are discussed in Bulletin P2547P (24 pages). Includes dimensional data and thrust charts. *Flick-Reedy Corp.*

27—Heavy - Duty Transmissions. Custom-designed transmission applications—from crash trucks to construction equipment—are shown in 8-pager. Covers standard single- and multiple-speed and right-angle drives. *Cotta Transmission Co.*

28—Chain Sprockets, Couplings. Bulletin A691 is a 56-pager that presents extensive line of roller chain and Taper-Lock sprockets. Includes selection and installation data, hp. ratings, lubrication data, etc. *Dodge Mfg. Co.*

Turn the page


Roofs of Patten Tractor & Equipment Co., Bellwood, Ill., are bright and weatherproof with Tenkote Aluminum Coatings, made by American Asbestos Products Company, Cleveland, Ohio.

still bright and tight after eight years' service

Construction-equipment distributor cuts maintenance bill with TENKOTE ALUMINUM ROOF COATING

How long should a roof coating stay attractive and waterproof? It varies with conditions, of course. But the makers of *Tenkote* Aluminum Coating have some enviable cases on file. Take Patten Tractor & Equipment Company, for example. R. S. Patten, executive vice president, writes:

"We coated the roofs and sides of our corrugated metal buildings in 1952 with *Tenkote*. You'll be interested to know that after eight years' service this aluminum coating is still bright and in very good condition. And, in our experience, *Tenkote* keeps these metal buildings much cooler in summer and warmer in winter. Also, they have been kept in good weatherproof condition without continued exterior maintenance."

Made with ALCOA® Pigments, good aluminum coatings like *Tenkote* are ideal for virtually any roof surface. Once applied, they stay firm on top, but soft and pliant underneath—no sag in summer or cracks in winter. Interiors are more comfortable because reflective aluminum turns back 70 per cent of the sun's radiant heat.

ALCOA does not make roof coatings, but we will be happy to refer you to reputable manufacturers who do. Send today for our booklets, *Painting With Aluminum* and *Aluminum Roof Coatings Make Time Stand Still.* Use the coupon.

PIGMENTED WITH ALCOA ALUMINUM

Look for this label when you buy aluminum paint

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and "Alcoa Theatre" alternate Mondays, NBC-TV

Aluminum Company of America
1739-D Alcoa Building, Pittsburgh 19, Pa.
Please send your free booklets:
☐ *Aluminum Roof Coatings Make Time Stand Still* ☐ *Painting With Aluminum*
Name_____
Company_____
Address_____
City_____ Zone___ State_____

THE IMPORTANCE OF EXPERIENCE

in Matters of Maintenance

Over 30 years of diversified experience in solving the varied preventative maintenance problems of industry has developed scientific abilities for Wilbur & Williams which can be invaluable to you. Surfaces that once were doomed to costly corrosive deterioration can now be throughly and quickly protected with Wilbur & Williams Specialized "Protectioneered" Maintenance Coatings.

Necessitated by problem corrosion — Envisioned through experience — Formulated through research — Proven through actual performance . . . We will be pleased to tell you more about Wilbur & Williams products in terms of your own maintenance problems.

RE-3 THE THREE-POINT product for re-roofing with a brush . . .

REFLECTS HEAT & COLD—INSULATES ROOFS AND SIDING

RENEWS ROOF—PREVENTS LEAKS

RECOLORS & BEAUTIFIES

Another MINIMUM — INTERRUPTION MAINTENANCE Product from . . .

THE WILBUR & WILLIAMS CO., INC.

Factory and General Offices, 651 Pleasant St., Norwood, Mass.

In Canada, WILBUR & WILLIAMS, 7920 16th Ave., Ville St. Michel, Montreal 38, P. Q.

FACTORY / CATALOG NEWS

Begins on page 252

For more about these items, circle item numbers on Reader Service Card next to back cover.

29—Ball Bearings. Two new series one with inch, the other with metri dimensions, are featured in 4-page (No. 112). Inch bearings come i 15 sizes; metric series has bore from 4 to 9 millimeters. *Hoove Ball and Bearing Co.*

INSTRUMENTS AND CONTROLS

30—Gages. Here's a 4-pager (No 3015) that provides a quick round-up of instruments to help yo choose the right one. Tables li tube forms and materials. *American Machine and Metals, Inc.*

31—Recording Instruments. Catalog No. 657-A (16 pages) describes and illustrates measuring devices for recording facts that lead to better service, new products, greater safety, and economical operation *The Esterline-Angus Co., Inc.*

32—Valves. This 4-pager (RDC-235) presents new poppet valves for company's pneumatically operated components. These valves eliminate need for electrically operated solenoids. Describes four new units. Diagrams. *Airelectric Corp.*

33—Flow Switch. Performance features of automatic flow controls are discussed in No. 2600 (8 pages). Tables show pipe and nozzles available for Shur-Flo automatic interlocking switch. Diagrams, flow capacity chart. *Hays Mfg. Co.*

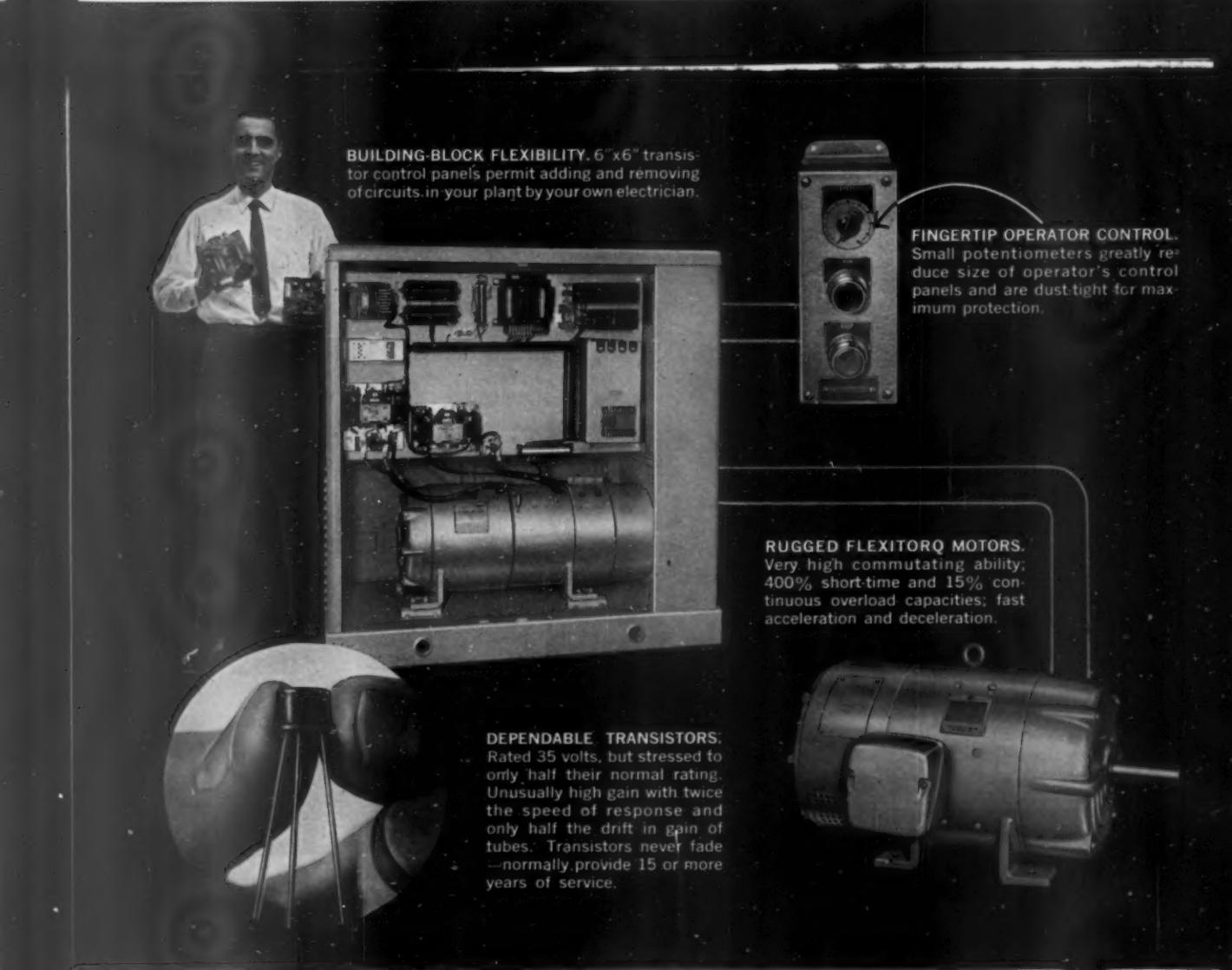
34—Data-Loggers. This 12-pager describes Data-Masters of various sizes and capacities from 50-point loggers up. Includes temperature, pressure, flow, humidity details. *Hanson-Gorrill-Brian, Inc.*

35—Tachometers. Nine indicators and six electric generators for tachometer service are described in this 4-pager. Explains variable speed applications, other details. *Madison Electric Products, Inc.*

Turn the page

For more facts Circle 558 on Reader Service Card

For more facts Circle 559 on Reader Service Card ▶


BUILDING-BLOCK FLEXIBILITY. 6"x6" transistor control panels permit adding and removing of circuits in your plant by your own electrician.
FINGERTIP OPERATOR CONTROL. Small potentiometers greatly reduce size of operator's control panels and are dust-tight for maximum protection.
RUGGED FLEXITORQ MOTORS. Very high commutating ability; 400% short-time and 15% continuous overload capacities; fast acceleration and deceleration.
DEPENDABLE TRANSISTORS. Rated 35 volts, but stressed to only half their normal rating. Unusually high gain with twice the speed of response and only half the drift in gain of tubes. Transistors never fade—normally provide 15 or more years of service.

The New LOUIS ALLIS Select-A-Spede® Drive —First with field-proved All-Transistor Control

a high-gain, high performance d-c drive with unmatched flexibility and low upkeep

Here's a superior adjustable speed drive with simplified transistor-magnetic amplifier control. It's the easiest drive to set up and operate. A twist of the dial gives you stepless speed adjustment from zero to full speed in either direction. Each adjustment is independent, thus sparing you the need for compensating adjustments of inter-related settings. You get more consistent day to day operation because transistors — *unlike tubes* — are highly dependable.

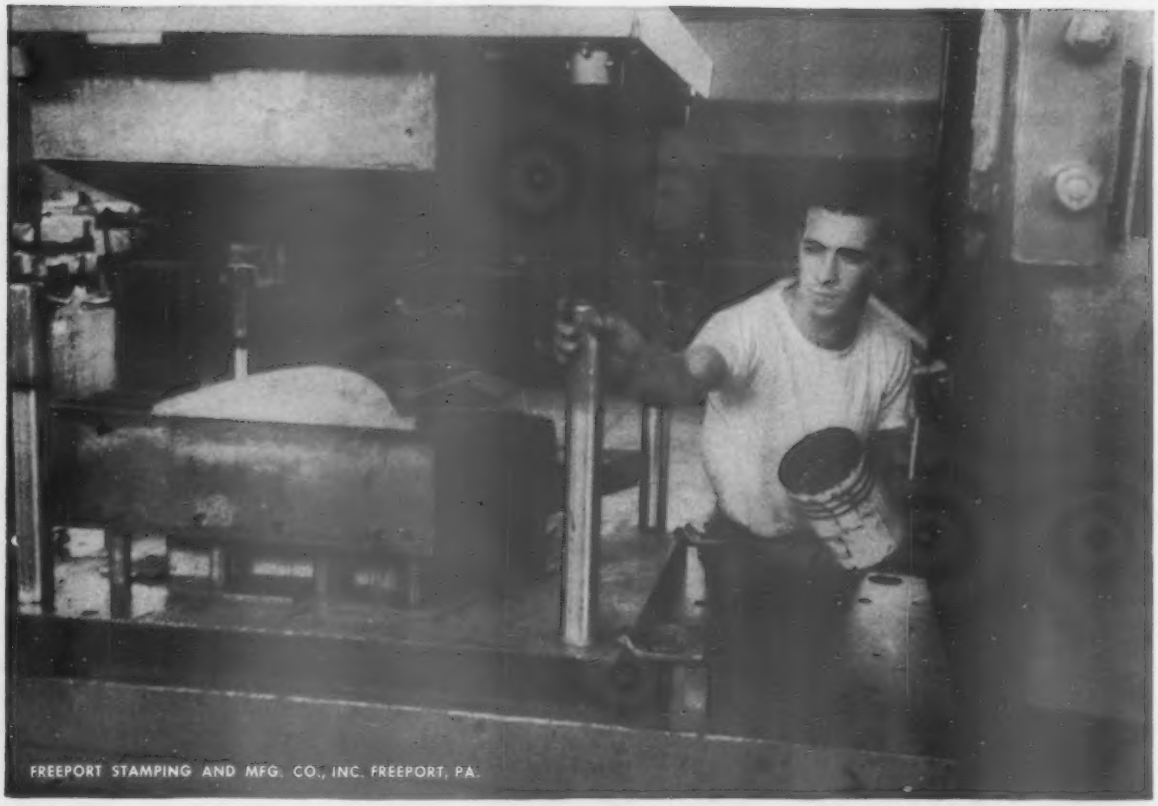
The new Select-A-Spede defies obsolescence. To add functions you simply have your electrician install any of 13 "building-block" control circuits as your conditions require. These circuits come on inexpensive 6" x 6" panels ready for installation and are immediately available from Louis Allis stock. Thus a rebuilding or adaptation job that, on former equipment, cost thousands of dollars — excluding downtime — can now be done at a fraction of the cost and time *right in your own plant!* High quality transistors, field proven in missiles and other advanced electronic equipment, assure you of a high degree of dependability with a life expectancy of 15 or more years. Printed low-voltage transistor circuits are virtually trouble-free and can be quickly and easily replaced from low-cost stock.

Further savings are provided by the new Louis Allis Flexitorq® drive motors through vastly improved commutation, low brush wear, and their ability to safely withstand momentary overloads of 400% of normal horsepower rating.

Select-A-Spede sizes from 5 to 400 hp, speed ranges up to 20:1. Contact any one of the 60 Louis Allis District Offices for information and application assistance. Or write for bulletin 2001 to The Louis Allis Co., 432 E. Stewart Street, Milwaukee 1, Wisconsin.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES



FREEPORT STAMPING AND MFG. CO., INC. FREEPORT, PA.

"Die Guides Needed Grease Every Few Hours... Cities Service Trojan HM Stays for Days"

Freeport Stamping has built a reputation for ultra-precision in its stampings. But one annoyance kept bothering the production department . . . die guides had to be lubricated every few hours or they started to bind and gall. Cities Service Lubrication Engineer, Robert Vey, suggested a change to new Trojan HM Grease, containing 3% molybdenum disulfide.

The very first application of Trojan HM kept the die guides operating smoothly for three days instead of the usual three hours. Cities Service Trojan HM Grease is a new lithium base lubricant combining high temperature characteristics with excellent low temperature pumpability, good water-resistant properties and high stability. New Trojan HM Grease is a tenacious lubricant with a plating action that extends the period between servicing.

If you have a grease problem, Cities Service is eager to serve you with free technical assistance and a full line of special and multi-purpose greases. For full information call your nearest Cities Service office or write: Cities Service Oil Company, Sixty Wall Tower, N. Y. 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

All Eleven presses at Freeport Stamping operate with Pacemaker #3 hydraulic oil. Pacemaker is a multi-use quality lubricant that helps reduce inventory. Freeport also uses Pacemaker in machine tools, and electric motors.

Compound Curves with one draw are possible with Cities Service Drawing Compound. Automobile parts being made for two major manufacturers, are used in a visible spot so they must be free of die marks as well as precision drawn.

FACTORY / CATALOG NEWS

Begins on page 252

For more about these items, circle item numbers on Reader Service Card next to back cover.

36—Control Valves. Here's an 8-pager (No. 5911251) that discusses function, method of application, and other details of fluid flow and condition control valves. *United Aircraft Products, Inc.*

37—Rotameters. This 6-page fold-out chart-style bulletin (No. 110) is a graphic selector for complete flow instrumentation. Gives basic advantages of variable area flow meters, shows specific applications. *Brooks Rotameter Co.*

38—Precision Meters. Current, voltage and high-resistance meters in portable, panel, and bench models are presented in illustrated 20-pager. Meter Master chart shows full-scale readings of all ranges. *Greibach Instruments Corp.*

PIPES AND VALVES

39—Pipes, Fittings, Valves. This informative 60-page bulletin presents a system of non-corrosive plumbing equipment. Describes the properties of Vulcathene plumbing; gives uses, cost comparisons, and other data. *The Nalge Co., Inc.*

40—Flexible Couplings. Design and installation features, selection of coupling sizes, and service factors for drivers are set forth in revised 10-pager (No. 5103). Tables of coupling ratings, load signals. *T. B. Wood's Sons Co.*

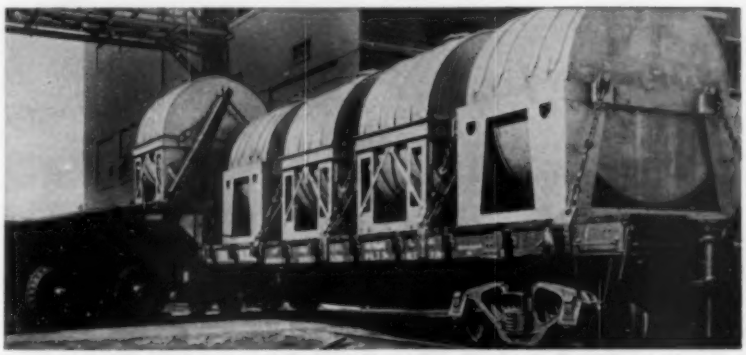
41—Tube Fittings. Catalog No. 3108 (48 pages) describes Hi-Seal butt-joint fitting line, and contains over 250 styles and sizes. Includes pressure, vacuum, temperature, vibration, assembly, other data. *The Imperial Brass Mfg. Co.*

42—Joints, Reducers, Pipes. This 6-pager (No. 850) discusses rubber expansion joints and flexible pipe for recirculating water systems, hot water lines, etc. Also describes Gen-Lok flanged flexible pipe. *General Rubber Corp.*

Turn the page

MULTIPLE SAVINGS...yours when you handle bulk materials with the LOAD LUGGER SYSTEM

Paper mill saves $6.00 a ton on cost of salt by buying and handling it by the Load Lugger container-load instead of by the bag.



Soap manufacturer reduces costs by handling and shipping vegetable oil in big tank-type Load Lugger containers—cuts handling time at loading and unloading points, too.

Salt, sulphur, soap, vegetable oil—solids, liquids, gases—you name it. The Load Lugger System will handle it at far less cost per ton, yard or gallon.

You save on manhours, on equipment. One man, the Load Lugger driver, is all the manpower you need. One Load Lugger equipped truck picks up, hauls and spots or dumps numerous big Load Lugger containers.* Because one Load Lugger truck does the work of a fleet, you save on operating and maintenance costs—and Load Lugger containers require no licenses or insurance.

*Capacities 1½ to 16 cubic yards

Telephone collect, Fireside 2-0136 to learn about the savings you can make with the Load Lugger system.

INGERSOLL KALAMAZOO B-W BORG-WARNER

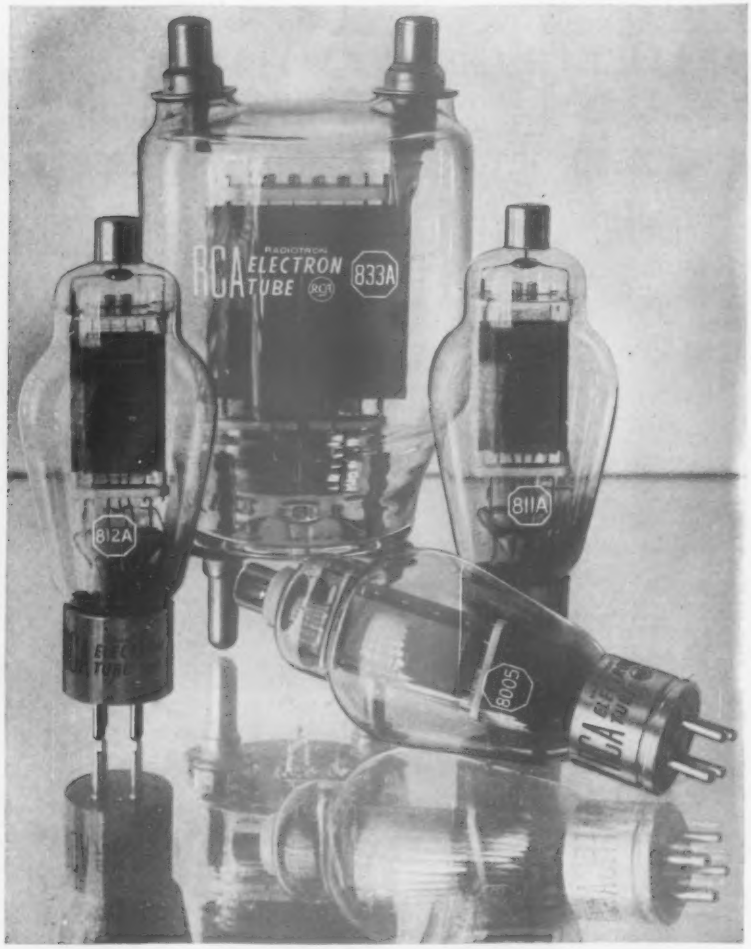
Borg-Warner Corporation

INGERSOLL KALAMAZOO DIVISION

714 Vine Street, Kalamazoo, Michigan, Telephone Fireside 5-3501

EXPORT SALES: BORG-WARNER INTERNATIONAL CORPORATION, CHICAGO

For more facts Circle 561 on Reader Service Card



replace with **RCA**

POWER TRIODES

for long life in industrial RF power applications

For reliability, high efficiency and long life in electronic heating and other industrial radio frequency power applications, make it a point to replace with RCA RF Power Triodes available from your local RCA Industrial Tube Distributor.

RCA Power Triodes are conservatively designed to provide efficient operation and long life under industrial conditions. This means less down-time as well as lower tube cost per hour of operation.

Your RCA Industrial Tube Distributor carries a complete line of RCA Power Tubes in a wide range of power and frequency ratings. Call him for immediate service on all your industrial tube needs.

RADIO CORPORATION OF AMERICA
Electron Tube Division *Harrison, N. J.*

VISIT RCA AT THE ELECTRONIC PARTS DISTRIBUTORS SHOW — OUR BOOTH IS NORTH EXHIBIT HALL #874, AND OUR DISPLAY ROOMS, 659-661

FACTORY / CATALOG NEWS

Begins on page 252

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIAL HANDLING

43—High-Flat Trailers. Here's a 4-pager that illustrates and describes extendible trailers. Tells how they adapt for general flatbed use when closed and are useful for transporting long loads when extended. *Rogers Bros. Corp.*

44—Storage Racks. Catalog No. 107 (8 pages) covers systems with only two basic parts that require no tools, bolts, or nuts. Every connector is locked four ways. Tables list basic parts. Diagrams. *Bernard Gloekler North East Co.*

45—Gluer and Sealer. Two automatic machines for gluing-sealing of paperboard shipping cases are discussed in 8-pager (100-37A). Explains operating sequence of both machines; lists modifications and accessories. *J. L. Ferguson Co.*

46—Fork Truck. This new 4-page booklet (B-626) highlights "Acro-Smooth," a carbon-pile speed control for 5000-lb.-capacity truck (Model F50T5). Gives analysis of each working part of truck, diagrams. *Elwell-Parker Electric Co.*

47—Tube-Rak Storage System. How the "perfect column" makes what is said to be the strongest upright frame today is told in an illustrated 4-pager. Describes special features; gives specifications, capacities, etc. *Artco Corp.*

48—Rope Winch. Specifications, capacity, and applications for Model 51 are given in 4-pager. This winch was designed specifically to enable a minimum work crew to load or unload cargo in shortest possible time. *Air Cargo Equipment Co.*

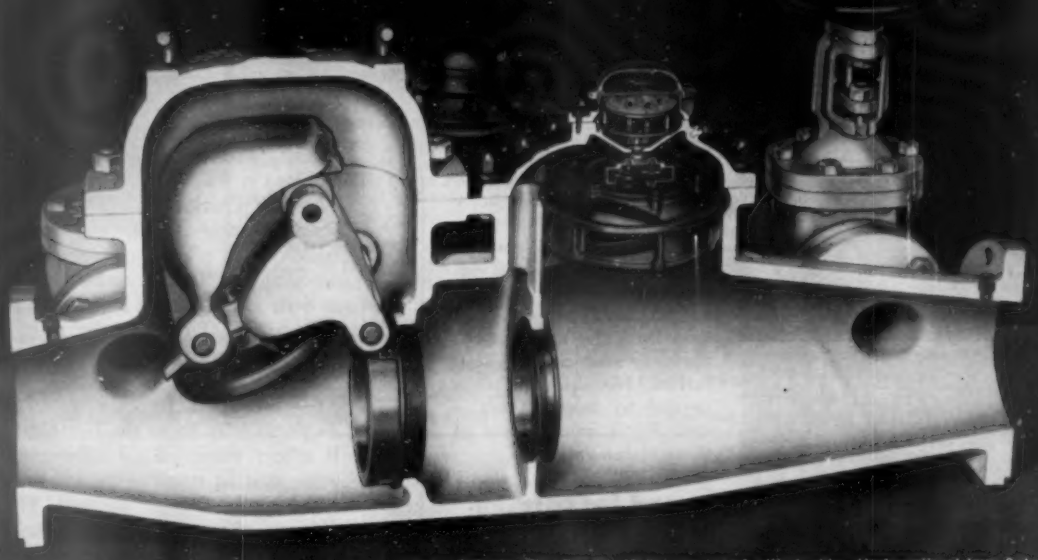
49—Scales. Slim brochure (2001e) describes all types—portable, bench, floor, built-in, motor truck, counting, net weight packing, mail and parcel post weighing equipment. Scales are grouped for easy reference. *Toledo Scale Corp.*

Turn the page

"YOU DON'T SHOP FOR VALVES

when you aim to build completely reliable equipment like our HERSEY METERS"

— says Hersey-Sparling Meter Company, Dedham, Mass.
Main Office and Plant, Dedham, Mass.



Hersey Detector-Fire Service Meter, equipped with Jenkins Underwriters' Iron Gate Valve

for 35 years, Hersey Meters have been equipped with JENKINS VALVES

Century-old Hersey-Sparling Meter Company does everything possible to make good its slogan — *You can't buy a better Water Meter than Hersey*. One example is seen in a rule that any part of the meter not made by Hersey must be obtained from sources which have Hersey's own policy of making the *Best*. For valves, Hersey's standard for quality has been JENKINS for 35 years.

Hersey-Sparling's customers, like the buyers of any equipment that incorporates valves, see the famous Jenkins DIAMOND trade-mark on the valves as a sure sign that nothing has been spared in assuring reliability and low maintenance costs. Architects, engineers, contractors and operating men are bound to respect equipment that carries the valves they so often specify to assure trouble-free piping systems.

Of course, valves of less quality can be had for a little less money. But it is worth remembering that Jenkins Valves, so widely known for reliability, cost no more than any *good* valves. Jenkins Bros., 100 Park Ave., New York 17.

JENKINS VALVES JENKINS SINCE 1864 Jenkins Bros

MOST TRUSTED TRADE-MARK IN THE VALVE WORLD

if awards were given for the best steel shelving value on the market . . .

BORROUGHS STEEL SHELVING

would be the winner!

Borroughs open and closed shelving is a leader because . . . it's ahead in simplicity — ahead in flexibility — ahead in ease and speed of assembly — ahead in exclusive features — ahead in rugged, solid stability. You save time and money from the very start of its installation. No special tools needed to assemble entire unit. For absolute proof of these statements . . .

send for catalog

Represented in Sweet's Catalog, Plant Engineering File 4G BO

Borroughs Shop Equipment another winner!

In rigid construction and efficiency of design, Borroughs Shop Equipment stands out in its field. Borroughs' line includes work benches, tool stands, utility carts, shop desks and tables, portable and semi-portable work bench kits, many accessories. Send for all the facts today.

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp KALAMAZOO, MICHIGAN

FACTORY / CATALOG NEWS

Begins on page 252

For more about these items, circle item numbers on Reader Service Card next to back cover.

50—All-Purpose Trucks. Specifications and illustrations of company's complete line are given in attractive catalog. Includes 27 standard styles and 150 standard-size platform, shelf, and other trucks. *Wilder Mfg. Co., Inc.*

51—Jetslingers. Folder No. 2721 (6 pages) describes these machines that are equipped with short, high-speed belt conveyors for hurling free-flowing bulk materials into areas inaccessible by other mechanical means. *Link-Belt Co.*

52—Lift Truck. This 18-pager presents a new truck, the "Naro-Aisle-Stack." Secret of space-saving advantages? Truck can be operated in 6-ft. aisles. Front end pivots full 180 deg.—90 deg. to the right or left. *Towmotor Corp.*

53—Conveyors. Bulletin No. 112 in 24 pages tells about the Handidrive. It offers standardized off-the-shelf units that fit together as integrated components. "Do-it-yourself" Handidrives are cost savers. *Standard Conveyor Co.*

BUILDING

54—Roofing and Siding. Catalog RI-142 (12 pages) discusses aluminum roofing and siding for durable low-cost construction. Charts, diagrams, photos give details on ribbed siding, other products. *Kaiser Aluminum & Chemical Sales.*

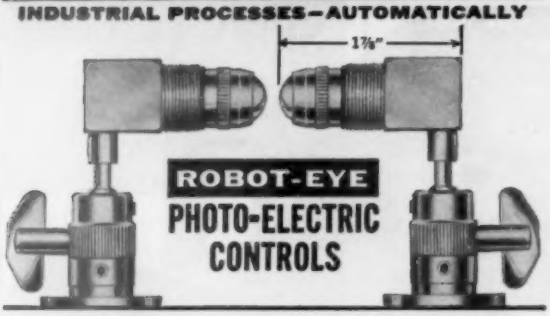
55—Fluorescent Lighting Tubes. Here's a 4-pager (AIA. File 31-F-2) that answers the question: What Is Good Light? Describes how Verilux specially designed and colored tubes reproduce "true" daylight. *Franklin Research Corp.*

56—Metal Windows. Reversible, sliding, awning, and other types of custom-made windows are covered in revised 20-pager (16-E). In aluminum, bronze, and stainless steel. *Albro Metal Products Corp.*

Turn the page

count, inspect, control

INDUSTRIAL PROCESSES—AUTOMATICALLY



Transistorized and Tube **AMPLIFIERS**

Plug-in relays, receptacles for plug-in connection of lamps and cells. Additional Plug-in accessories include counters and time delays.

MINIATURIZED
Small, for "tight-spot" installation, yet rugged for long service. Accurate, for precise automatic control in virtually any industry.

INTER-CONNECTING
Plug-in terminals available for quick connection to any of a wide range of Amplifiers. This design enables you to select the most economical amplifier for your job requirements.

INEXPENSIVE
Standard Set P-5 is $17. Set P-5S is $21. Amplifiers start at $39.50. For complete data, write for Brochure NP-4

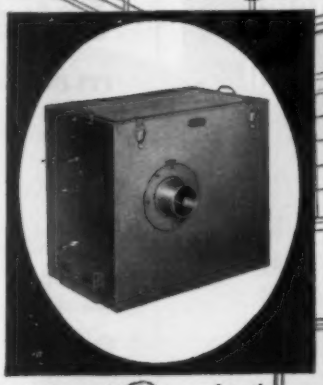
standard INSTRUMENT CORPORATION
657 BROADWAY, NEW YORK 12, N.Y.

For more facts Circle 565 on Reader Service Card

DUSTKOP "520"

designed to collect dust from single machines

portable—easily installed



DUSTKOP STOPS DUST

Self-contained Dustkop models, like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

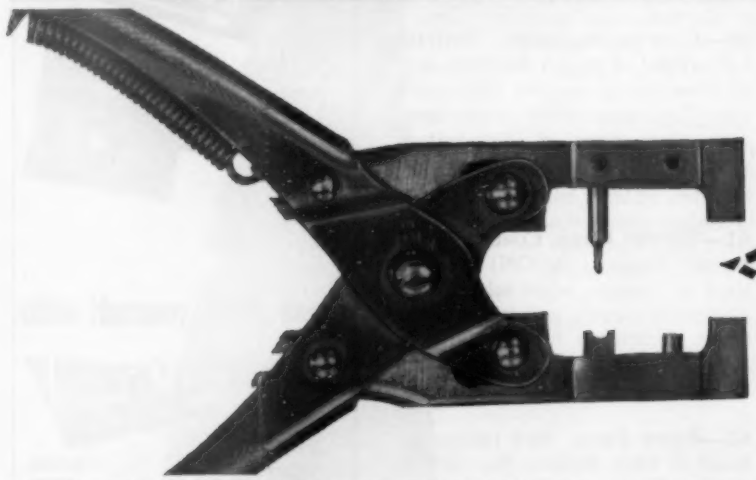
Write for illustrated literature
46 models to choose from!

NEW DUSTKOP AUTO SHAKER shakes filters AUTOMATICALLY

AGET manufacturing company
1410 E. Church Street, Adrian, Michigan

ask for details

For more facts Circle 566 on Reader Service Card



Sargent has a plier-type tool that'll save you money (and if we don't, we'll make one for you!)

Every Sargent tool is tailor-made for **one** particular job. This means top performance . . . saving you time and money far beyond that of an ordinary "all purpose" tool.

If there isn't a Sargent tool that'll handle your job, we will make a "special" for you. Because of Sargent's unique component part construction "specials" are easily designed to fit your specifications.

SARGENT
hand tool division

SARGENT & COMPANY, New Haven 9, Conn. 22-D

Please send Sargent's Hand Tool Manual containing industrial application data for plier-type tools and selected case histories.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

Sargent plier-type tools cut • strip • punch • bend • twist • form • straighten • pull • push • insert • extract • press • crimp • squeeze • set • grip • and spread

For more facts Circle 567 on Reader Service Card

Versatile efficiency and economy with...

MYCOLEUM

Perfectly safe on any surface!

MYCOLEUM all-purpose neutral liquid soap is kind to the most delicate tiles and resilients, yet gives real cleaning power and economy on all resilient, non-resilient and sealed wood floors. Its low-sudsing, free-rinsing properties keep time and labor costs down. And it's an ideal general purpose cleaner for wall, woodwork, and all painted surfaces.

Let Mike 'O clean up for you!

MYCO

Write for information

MASURY-YOUNG CO.
76 Roland Street Boston 29, Massachusetts
OFFICES IN PRINCIPAL CITIES

FACTORY / CATALOG NEWS

Begins on page 252

For more about these items, circle item numbers on Reader Service Card next to back cover.

57—AIRadiators. This 16-page illustrated catalog outlines basic factors to help in the selection of heat distribution equipment. Tables of sizes and ratings, conversion; roughing-in dimensions, other data. *Shaw-Perkins Mfg. Co.*

58—Rolling Grilles. How these grilles provide attractive and practical protection, visibility, and ventilation is set forth in 4-pager (No. 6004). In steel or aluminum for push-up, chain, crank, or motor operation. *The Cookson Co.*

59—Electric Door Operators. Here's an 8-pager (F8436-2) that tells how electric door and gate operators work, how constructed, advantages, and the like. Includes "proof" of savings by electric operation. *Barber-Colman Co.*

ELECTRICAL

60—Conversion Units. Bulletin GEA-7060 (4 pages) describes new oil-filled silicon rectifier conversion units for electrostatic precipitator and other types of high-voltage power supplies. Application photos. *General Electric Co.*

61—Standby Plants, Controls. This 8-page folder (32c/ON) outlines steps to consider when selecting an emergency electric generating plant. Gives suggestions for planning the installation, other data. *D. W. Onan & Sons Inc.*

62—Power Fuses. New ratings are listed in Data Bulletin No. 205 (6 pages). Covers interrupting ratings, ratings with and without mufflers, for indoor and outdoor holders, for solid material and liquid fuses. *S & C Electric Co.*

63—D-C Motors. Open and totally enclosed fractional hp. d-c motors are illustrated and described in fact sheet (GEC-1539). Gives applications for motors in ratings of 1/20 to 1 hp. at 3450 to 860 rpm. *General Electric Co.*

YOU NEED SIGNS AND NAMEPLATES TO TELL

WHO

WHICH

WHAT

WHERE

HOW

make them yourself with Engravograph

NO SKILL NEEDED

Send for booklet FF-1

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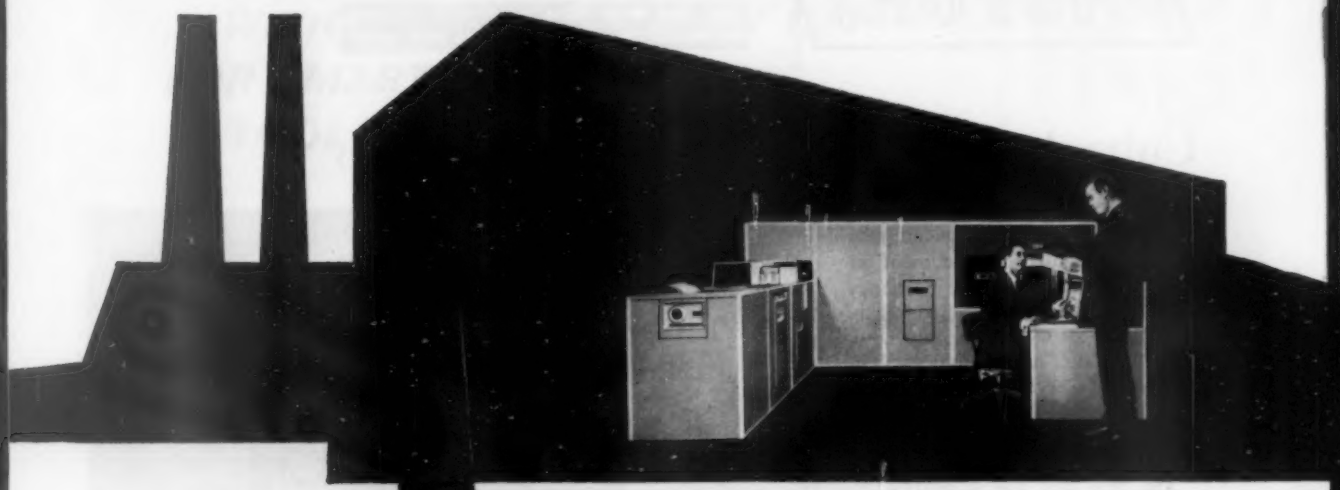
ENGRAVING MACHINE CORP.
154 WEST 14TH STREET NEW YORK 11, N.Y.

one late decision on inventory and this $50 part could cost you $5,000



IBM RAMAC® 305

controls inventory data to prevent costly "out-of-stock" conditions

A delay in production caused by an "out-of-stock" part can make that part the most expensive item in your stock. IBM RAMAC 305 gives you the fast and accurate control over inventory that helps you avoid costly shortages—or equally costly overstocking.

As each transaction is entered into RAMAC, all affected records are immediately posted and updated. Management may inquire as to the status of any specified item in inventory. This random access ability is an exclusive feature of the IBM RAMAC.

Balanced Data Processing . . . IBM services as well as machines . . . is a continuing responsibility of IBM to its customers. Like all IBM data processing equipment, RAMAC 305 may be purchased or leased.

IBM®

balanced data processing

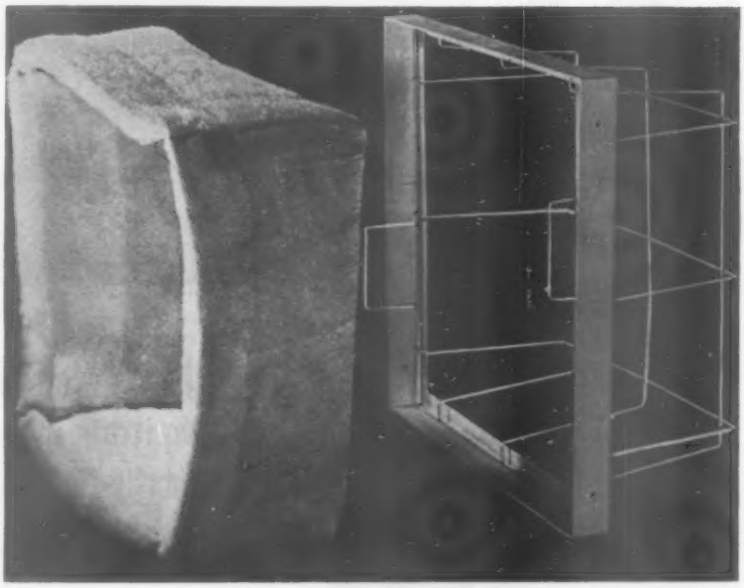
For more facts Circle 570 on Reader Service Card

Cube Air Filter Has Low Pressure Drop

Substantial savings in filter costs are promised by this new, uniquely constructed "cube" replacement air filter. Combining high efficiency with exceptionally low pressure drop throughout its useful life, the Ulok Cube Air Filter has demonstrated in field tests a service life at least six times longer than conventional throwaways and permanent metal filters.

The new unit has a lightweight Dynel modacrylic filtering medium, a uniquely processed filter bat, and open-side cube construction.

In operation, the airstream carries dirt into the cube to the front surface of the downstream face of the filter. As dirt builds up on this face, air flow is shunted to the sides of the cube. Comes in standard sizes to 16x25 in. *Union Carbide Corp.* (Circle 195).



Looking for Do-It-Yourself Tool Material?

Powder metallurgy techniques are used to produce Ferro-Tic S, a mixture of tiny titanium carbide crystals embedded in a relatively soft matrix of stainless steel. The result is a composite of the best properties of both components: the machinability and resistance to heat and corrosion of stainless steel, and the ultra-hardness of titanium carbide. The new carbides can be readily worked in the shop to form special tools. *Chromalloy Corp.* (Circle 196).

Resin Filler-Adhesive Is Easily Worked

An epoxy resin-based paste, REN Shape, can be used either as filler or adhesive. Material mixes easily, cures in 30 minutes. Shrinkage is only 0.003 in. to the foot. Applications: pattern-making, patching, pipe repair and insulation, etc. *Ren Plastics, Inc.* (Circle 197).

198—Water Repellent for masonry uses silicone to give maximum moisture protection. Hydrocide S-X Colorless "Hycon" is especially resistant to breakdown after continued exposure to freeze-thaw cycles. Tests indicate a new high in durability. *L. Sonneborn Sons, Inc.*

199—Latex Laminated Paper provides a tough, non-staining, flexible wrap to protect metal stock during shipment. Seekure 259 has Hycar latex as a modifier in the waterproof laminant which helps resist abrasion and effects of grease and oil. *American Sisalkraft Corp.*

200—Silicone Rubber possesses a new low viscosity, vulcanizes at room temperature. The RTV-11 contains no solvent, has excellent resistance to temperature extremes, ozone, and aging. Has a typical viscosity of 120 poises, making it easily pourable. *General Electric Co.*

Turn the page

A NEW IMPACTOOL

...WITH EXTRAS THAT PAY OFF FOR SMART TOOL BUYERS!

6-Vane Air Motor
Compare a "six" with a "four"! I-R's 6-Vanes give you greater power, smoother operation, higher starting torque.

"2-Pack" Construction
Either the impact mechanism "pack" or the motor "pack" can be serviced individually without disturbing the other.

Rugged Steel Hammer Case
For a lifetime of service! This exclusive I-R feature protects hammer mechanism, but is lightweight for easy handling.

new
Size 808 Impactool
⅜" drive

"Cuss-proof" Socket Retainer
Sockets can't fall off accidentally, but strong, spring-held retainer can be easily replaced. Another I-R exclusive.

Built-in Air Control
Air-balanced throttle valve provides full power range with smooth and complete control. Not just an "on and off" throttle.

Precision Quality
Special electronic equipment double-checks machined parts for perfect mating of all surfaces and bores.

LOOK FOR I-R EXTRAS BEFORE YOU BUY!

Smart buyers and experienced tool men know these Ingersoll-Rand EXTRAS pay off . . . in terms of longer tool life, easier maintenance, and better nut running performance. With them you get 20% more power and 200% faster rundown in a precision tool so small (7½") and light (8⅞ lbs.) you can use it anywhere.

For details on the all-new Size 808 Impactool, call your I-R representative today. Or write: Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

34A-8

Ingersoll-Rand
Tools plus AIRengineering increase output per man

The operatorless Barrett Guide-O-Matic Tractor offers tremendous savings through planned material movement—every trip a pay load.

Is yours a mechanical or hydraulic hand truck problem? Barrett's complete line includes the rugged, hydraulic Model HX.

Another remarkable record-producer in the Barrett line—the powerful, efficient electric Barrett Palletier.

Engineered to the job... that's BARRETT!

Material handling jobs start with the *problem:* how to move products efficiently, at lowest cost.

What's the *answer?* Select handling equipment engineered and built to do the exact job.

Three examples demonstrate Barrett's *engineered* problem-solving ability. One is the operatorless Barrett Guide-O-Matic® —an exclusive Barrett engineering development. Here's low cost, electronic material handling—no waste motion—no time loss.

Barrett's complete line of hand trucks offers exclusive engineering features. A third example is the Barrett electric Palletier—again job-engineered.

Only Barrett offers a complete line from electronically operated to hand-operated equipment. Your problems and needs can certainly be answered by Barrett.

Barrett-Cravens Company, Northbrook, Illinois—representatives in all principal cities.

Proved Handling Methods and Profitable Ideas. Get your copy of "Methods and Ideas," a picture-story showing how Barrett handling equipment works for industry. Forty-nine examples of correct design and construction applied to as many handling operations...ingenious applications of attachments...how Barrett can solve your problem efficiently and economically. Send coupon now.

Barrett-Cravens Company, 616 Dundee Road • Northbrook, Ill.

Gentlemen: Please send me "Methods and Ideas." Also Bulletins on .....Guide-O-Matic, ...Model HX, ...Palletier.

Name.....*Title*.....

Company.....

Address.....

City.....*Zone*.....*State*.....

FACTORY / MATERIALS NEWS

Begins on page 270

For more about these items, circle item numbers on Reader Service Card next to back cover.

201—Thermal Insulation is castable, rapid setting. The one-coat material can be hand-packed, troweled, injected, or sprayed to any desired thickness. Pipe jackets can be pre-molded, stored until needed. And the insulation is non-corrosive. *Thermold Products Co.*

202—Roof Sealer goes on over wet roofs. Wet Weather Seal-Kote, a liquid asbestos roofing compound, can even be applied in a driving rain. It seals cracks and holes permanently, won't blister, crack, or run. In 5-, 30-, and 55-gal. sizes. *Paramount Industrial Products Co.*

203—Pressure-Sensitive Adhesive has been formulated especially to bond supported vinyl and polyethylene insulations to wood, metals, paper, fiberboard. The liquid adhesive won't stain or crystallize, has a high resistance to ultra-violet light. *Schwartz Chemical Co.*

204—Processed Mineral Clay absorbs soluble oil, lubricating oil, grease, acids, and chemicals. Spread on wood, metal, or concrete floors, non-slip Oil Spunj absorbs until saturated, then is easily swept off. Meets UL and government specifications. *Canfield Oil Co.*

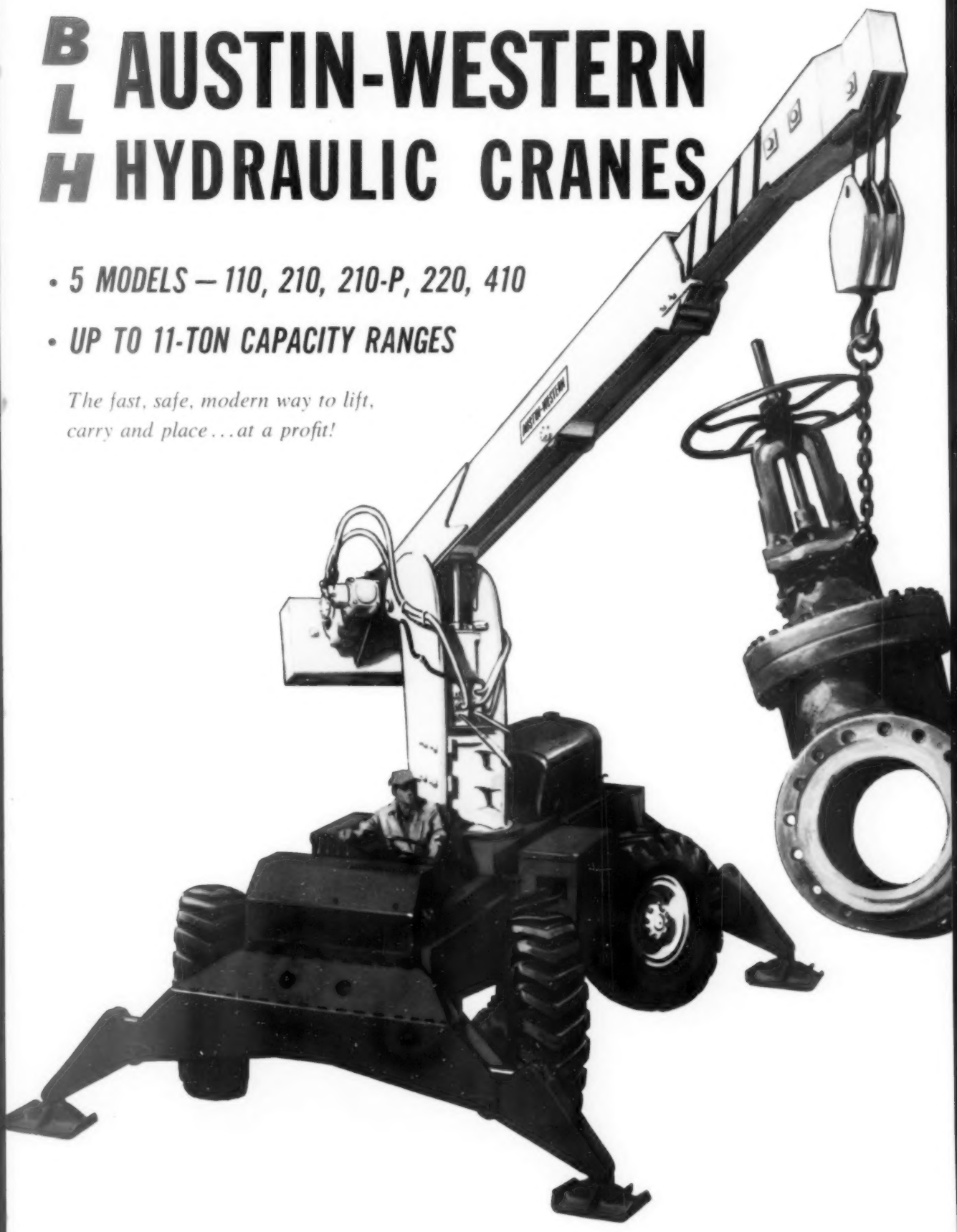
205—High Temperature Tubes, made of High Yield Cupro Nickel alloy, have a useful operating range up to 750 F. Both yield and tensile strengths are 30% higher than standard 70/30 Cupro Nickel. Meet ASME specifications (Boiler Code Case 1266). *Bridgeport Brass Co.*

Turn to page 278

BLH AUSTIN-WESTERN HYDRAULIC CRANES

- *5 MODELS — 110, 210, 210-P, 220, 410*
- *UP TO 11-TON CAPACITY RANGES*

The fast, safe, modern way to lift, carry and place . . . at a profit!



Austin-Western's telescoping delivers unequaled precision,

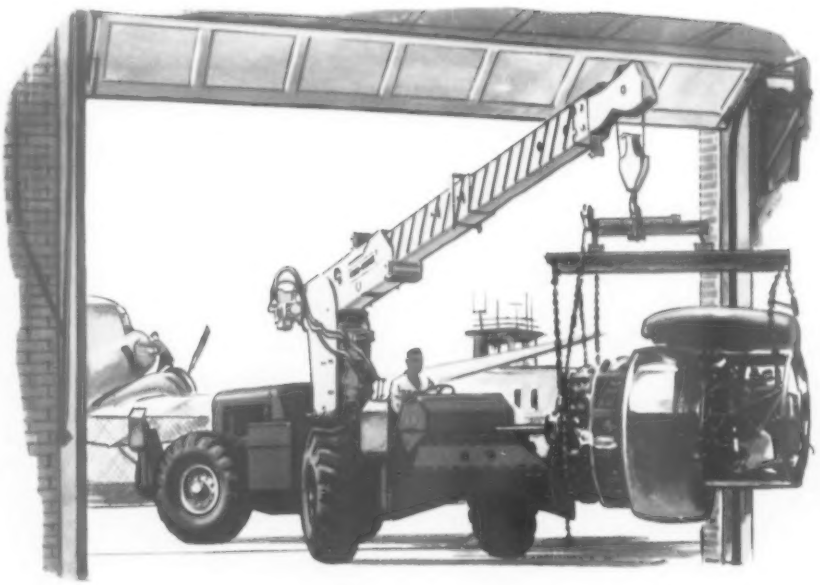
MODEL 110

5-ton range — The 110 is the mighty midget of the A-W line—but what a midget! It'll outlift all other 3-wheel cranes over-the-side! It's industry's answer to fork truck limitations. The 110 has an 18 ft. 7 in. boom reach; 220° boom swing. Low 8 ft. 10 in. overhead clearance. Operates with ease in close quarters; handles loads in 5-ton range.

Features dual front driving wheels; dual tire rear trunnion power steer — road speeds from 2 to 18 mph. Torque converter and full hydraulic reversing mechanism standard. The unit can be tailored to your particular job needs with various combinations of features and equipment.

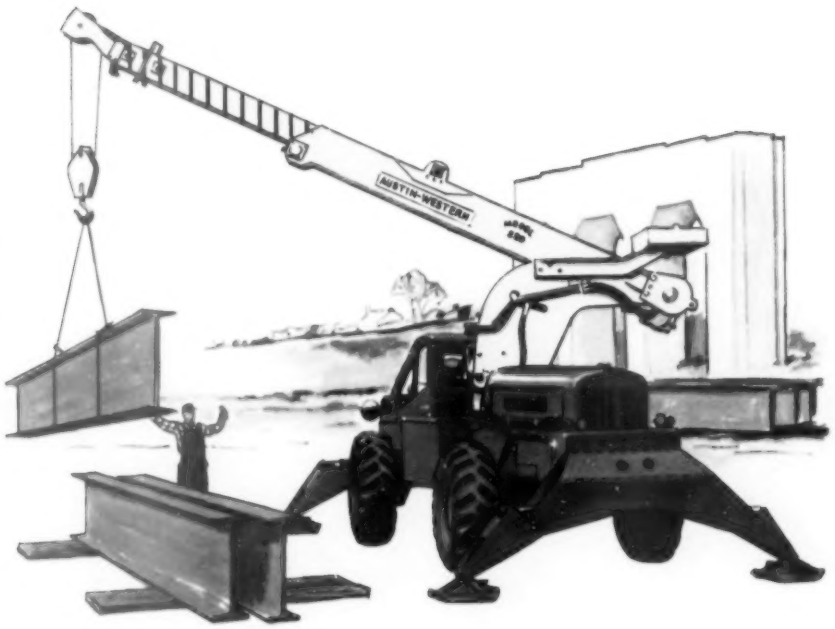
MODEL 210

7-ton range—This basic model of the hydraulic crane line is rubber mounted, self-propelled; capable of road speeds up to 35mph. A real workhorse for an astounding variety of lift, carry and place assignments. 18-foot telescoping boom rotates in continuous full circle, maximum 35-foot boom reach optional. All-wheel steering gives unlimited maneuverability in tightest spots; all-wheel drive means plenty of traction for loaded boom travel on any surface. Low overhead clearance. Operation is fully hydraulic, including outriggers.



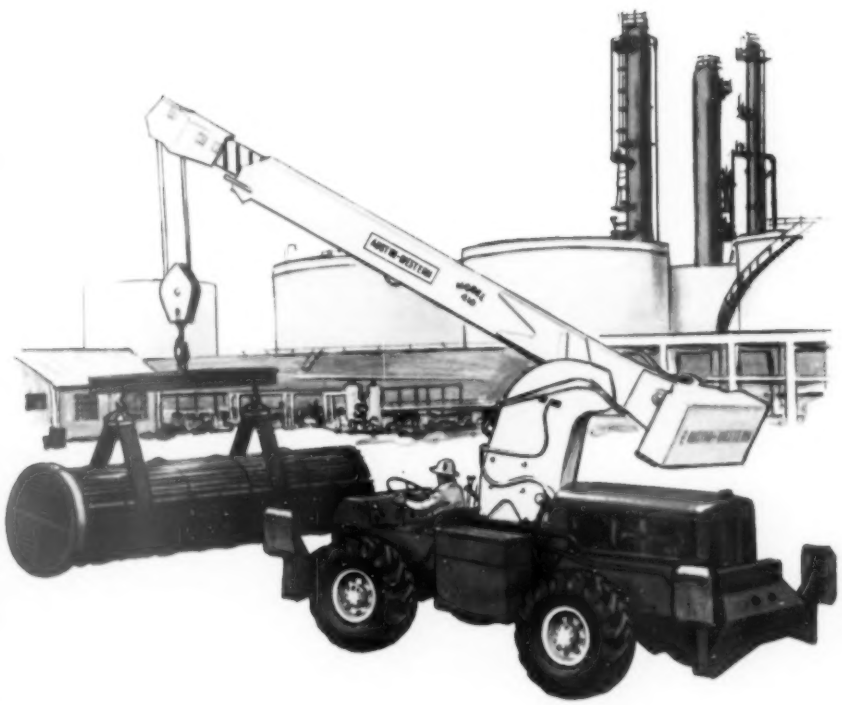
live hydraulic boom safety, flexibility

- *Extends and retracts*
- *Raises and lowers*
- *Reaches up and in*
- *Reaches out and over*
- *Full hydraulic control*
- *Two or more movements with full boom load*
- *Continuous full circle rotation on most models*



MODEL 220

8-ton range—The Model 220 is a modified version of the basic Model 210. Its counterweighted boom as well as heavier structural design give it added lifting capacity into the 8-ton range. Like the 210, it features an 18-ft. telescoping boom, with maximum 35-ft. boom reach optional; continuous full circle swing; all-wheel drive and all-wheel steering. Full hydraulic controls mean tops in precision, safety, ease of operation.



MODEL 410

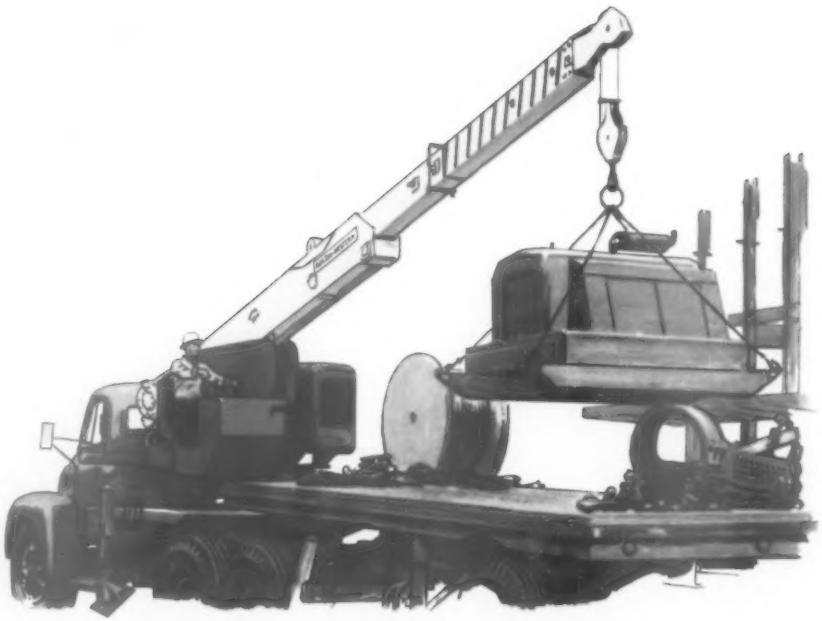
11-ton range — This big brute, the Model 410, is the heavy-duty unit in the A-W crane line. Like the 210 and 220, it is self-propelled; 25-ft. telescoping boom rotates in continuous full circle with maximum 48-ft. boom reach optional; raises to a 60° angle from horizontal.

Gas or diesel power; all-wheel drive and all-wheel steer are available. Travels from job to job at road speeds to 30 mph. This rugged, mobile crane is the rig for you if you need big crane capacity without sacrificing the profitable advantages of flexibility, versatility and mobility inherent in all models of Austin-Western hydraulic cranes.

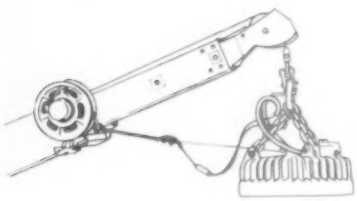
MODEL 210-P

FOR TRUCK OR STATIONARY MOUNTING

7-ton range—The Model 210-P is the famous Austin-Western live 210 hydraulic boom . . . available as a package unit for truck or stationary mounting. Its 18-ft. telescoping boom rotates in a continuous circle; maximum 35-foot boom reach optional; lift capacity is in the 7-ton range. Can't be beat for crane applications requiring a high degree of mobility. This unit, like all other A-W cranes, can be equipped with a wide variety of attachments for extra versatility—such as clamshell, orange peel, maintenance platform, etc.

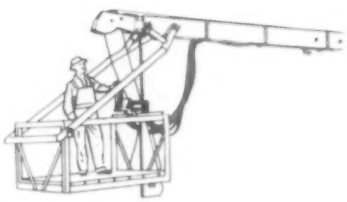


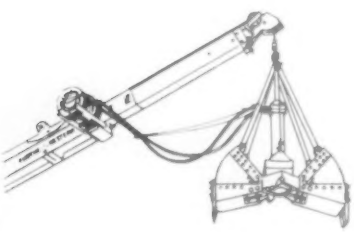
FOR GREATER VERSATILITY—A WIDE CHOICE OF OPTIONAL ATTACHMENTS AND EQUIPMENT



MAGNET

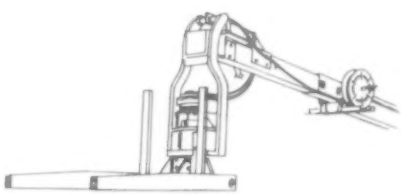
REMOTE CONTROL MAINTENANCE PLATFORM





CLAMSHELL BUCKET

LIFT FORK



Also available for most models:

- ***Orange Peel Bucket***
- ***Cab***
- ***Snow Plow***
- ***Rail Guide Wheels***
- ***Hydraulic Outriggers***
- ***Power Take-Off***
- ***Load Carrying Platform***
- ***Winch***
- ***Bulldozer Blade***
- ***Manual Boom Extensions***
- ***Pintle Hook***

Learn the facts today about the A-W crane best suited to profitably perform your lift, carry or place requirements!

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Protects against liquid and solid irritants not soluble in water. When washed off, expansion action provides "lift" that pushes particles and irritants away from the skin.

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Protects against water and water-soluble irritants. Hands may be washed while wearing Kerodex 71 because this cream does not wash off but gradually wears off.

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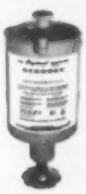

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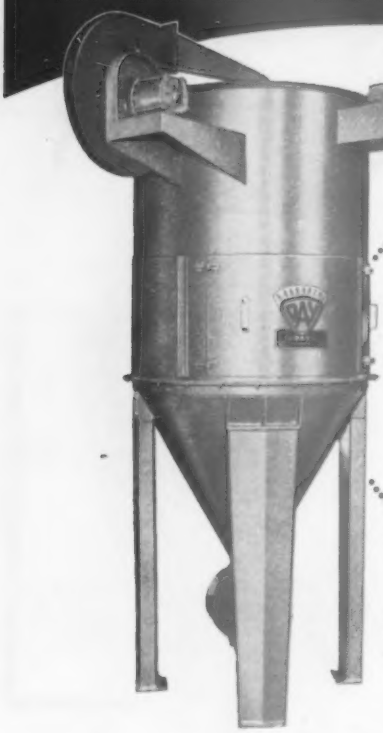
New DAY "RJ" Dust Filter

CONTROLS DUST SAVES DOLLARS



only **3** moving parts

Built under patents of The DAY Company and H. J. Hersey, Jr.

Because of its new, simplified design the DAY "RJ" dust filter will save you many dollars on initial investment, installation, operation and maintenance. Some of the important new construction features of this dust filter are: a new, quick-opening reverse-air, counter-flow valve for maintaining filter media porosity; a new, reverse-air pressure blower arrangement, and new, air tight, yet quickly opened inspection doors.

This patented DAY dust filter has only 3 moving parts but controls dust effectively, efficiently (99.99+%) and economically. It represents the latest refinement in a long-tested, plant-proven dust filter. Using felted filter sleeves to capture dust, the "RJ" is now available in 5 sizes for handling from 300 to 6400 CFM of air (for larger capacities, multiple groupings are furnished).

For more detailed information write toDAY for free Bulletin G-30. It's filled with facts, specifications and dimensions.

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FACTORY / MATERIALS NEWS

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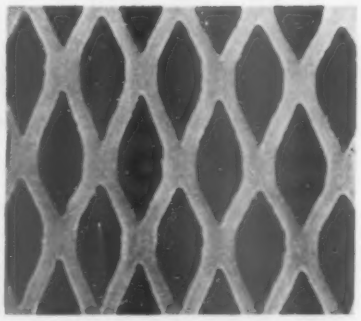
For more about these items, circle item numbers on Reader Service Card next to back cover.



206—Non-Woven Plastic Netting of polyethylene and polypropylene is made by a standard metal fabrication technique—perforating and expanding. Potential uses: decorative grids, filter grids, shock-absorbing protective wrappings. Price: 15¢ per sq. ft. *Reeves Brothers, Inc.*

207—Floor Patching and resurfacing compound has an impact and abrasion resistance five times greater than concrete. RIW Epo-Tox may be applied in layers as thin as one-eighth of an inch thick, protects against most industrial acids, alkalies, and solvents. *Toch Brothers.*

208—Copper-Clad Laminate with excellent punching and electrical characteristics offers high surface resistivity, low dielectric loss. Both Grade 320-R (with rolled copper foil) and 320-E (with electrolytically deposited foil) have high bond strength. *Taylor Fibre Co.*

209—Industrial Safety Paint in two plant test kits allows comparison of Hi-Viz fluorescent paints with conventional colors. Safety colors come in aerosol spray cans, are formulated in alkyd enamel and acrylic lacquer. May also be brushed or rolled. *Lawter Chemicals, Inc.*

210—Multi-Purpose Oil, Anderol L-456, offers extreme pressure qualities, penetration, and compatibility with ordinary lubricants. The medium-heavy diester oil has a 40-350 F. temperature range, a viscosity index of 174, excellent oxidation stability. *Lehigh Chemical Co.*

Turn the page

New All-Electric Hypressure Jenny!

Anywhere that flame, fumes, or excess water are objectionable or hazardous, the new Model E-350 All-Electric Jenny® will solve the cleaning or sanitizing problem. And with the new Jenolizing Process, machinery, equipment, and parts are left with a coating that protects against flash rusting, and gives a glossy, like-new appearance to painted surfaces.

Model E-350 combines the right amounts of heat, pressure, and cleaning solution to handle the majority of cleaning jobs at savings of up to 80% in time and labor costs. Its compact size, portability, low water output, and quiet operation without flame, smoke, or fuel fumes, make it ideal for use practically anywhere in the plant.

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Perfect for

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FACTORY / MATERIALS NEWS

Begins on page 270

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS LITERATURE

211—Tape Packagineering is described in a pair of colorful 4-pagers. These show advantages of gummed paper tapes, give strength specifications, sizes available; tell how to reduce packaging costs with tape. *Minnesota Mining & Mfg. Co.*

212—Chromel-R Wire for precision-wound resistors and potentiometers is covered in this 8-page technical bulletin. Data include table of physical properties, temperature coefficient curve, breaking and yield strength. *Hoskins Mfg. Co.*

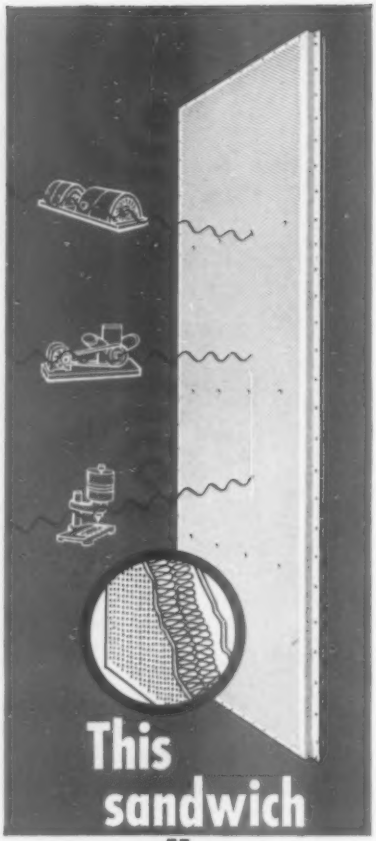
213—Plastic Sheet, Rod, Tubing and other forms are detailed in a 56-page plastics catalog and price list. Gives complete information on grades, sizes, and tolerances of most popular rigid and flexible plastic forms. *Almac Plastics, Inc.*

214—Stainless Steel Tubing is subject of a 34-page booklet that gives complete details on sizes, grades, design data, and corrosion resistance in both welded and seamless tubing. *Allegheny Ludlum Steel Corp.*

215—Ceramic Fiber that withstands operating temperatures up to 2300 F. is treated in an 8-page multi-color brochure. Lists properties, available forms, uses (such as packing, insulation, sandwich panel filler). *The Carborundum Co.*

216—Complete Line of gases, chemicals, lime products, acetylene, and calcium carbide is described for the first time in this 4-page guide. Tabulates physical properties, shipping information, plant locations. *Union Carbide Olefins Co.*

217—Industrial Safety Paint is illustrated in this 8-pager. Compares fluorescent with conventional safety paints, shows nine detailed applications where paint can cut hazards, increase plant safety factor. *Switzer Brothers, Inc.*



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We also have a free folder that tells how Eckoustic Panels can help you solve sound control problems faster and more economically than you may have thought possible.

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FACTORY BOOKS

No-Nonsense Look at Computers

This sound, readable introduction to computers, accurately named *Computers and People*, is written for the management men who will use them. By avoiding the usual "Gee Whiz!" treatment of a few glamorous but unlikely applications, and by treating computers as management tools with definite limitations, the author has come up with a really helpful book. He deals with both the promise and the problems of an installation from the standpoint of the over-all relation of computers to business activities.

Consideration is given to such factors as deciding upon the long- and short-range objectives of an installation, orienting the computer to the over-all objectives of the business, adjusting the computer and the existing data-processing systems to one another, and finding a sound bread-and-butter application with which to get started. Computer economics are also discussed, along with the equipment available and the social and psychological aspects involved.

Some of the influences that cause installations to fall short of expectations are also dealt with, including employee resistance, lack of management confidence in the operation, poor planning, and misplaced emphasis. Careful safeguards must be set up to prevent the actual virtues of a computer from becoming its vices. For example, the remark that "computers only process the same errors twice as fast" is not entirely unjustified because of the speed with which human input errors are spread throughout the system. Another difficulty: To avoid over-rating computers, management may seriously under-rate them. Computers that only generate reports, instead of making decisions, are often elaborate failures, because their full potential is not used.

The author rounds out his study with a brief history of computer development and a penetrating analysis of some of the equipment and applications we may expect to see in the future. He gives us another highlight in his evaluation of the complex and important role of the computer manufacturer.

In summary, this is excellent fare that sweeps away a lot of the cobwebs and confusion associated with business computers. (Reviewed by Roger W. Christian.)

Computers and People, by John A. Postley. McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 17. 241 pages. $6.

On the Lighter Side

For a picture of the lighter side of the business executive's busy life, *The Embattled Executive* rates high on our list. In this book the American Management Association uses 85 humorous illustrations but few words to help executives see their problems in a different light. The result is both refreshing and unusual.

The 96-page book takes less than an hour to read completely. But the humor in this cartoon book is not for humor's sake but for a serious purpose. The theme is carried out by a little figure who represents everything a manager shouldn't be. Meanwhile, the witty text points out where he goes wrong.

The Embattled Executive. Text by Lydia Strong, Drawings by Al Hormel. American Management Association, 1515 Broadway, New York 36. 96 pages. $1.95.

Technical Economics

Technical men, especially engineers, often have to make decisions about the acquisition or retirement of capital goods. Yet many of them lack the economic training to make sound recommendations. *Principles of Engineering Economy* helps fill this need. It offers an exhaustive study of economic decision-making about capital goods. It presents guiding principles to the choice of economic alternatives (for example, ownership vs. leasing).

Of special interest is the chapter

Imagine the odds management is bucking!

No, you can't blame the men. They clocked in at eight this morning – but, as yet, the work hasn't reached their department. Pitching pennies at least passes the time. But you can bet that game of theirs will show up in the company's P and L!

Sometime soon, when work *does* come through, their department will need an extra shift to get it done. What with down-time one week and overtime the next, the game of chance management's playing is hardly penny-ante.

Too bad this company didn't know about Automatic Keysort Data Processing! With Automatic Keysort's weekly work-load summaries, management would have been aware of the exact situation in every department in the plant. Knowing *on time* which were due to be light, and which overloaded, they could have acted *fast* to arrange schedules, transfers, extra shifts. Being informed of things almost as they happened, they could have kept production moving smoothly—and profitably.

Automatic Keysort's easy-to-use machines and punched cards require no specialized personnel, no restrictive procedures. Designed to fit your business as it stands and as it grows, Keysort will give you all the fast, accurate information you need for modern management control of every operation. And at remarkably low cost.

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Only T-J's complete line can assure you a cylinder of either air or hydraulic application – with practically limitless design specifications for bore, stroke, pressure range and even delivery requirement. From the time-tested, standard tie-rod air and hydraulic, to the exclusive T-J Spacemaker, and including the recently introduced Squair Head, T-J cylinders give you more features for efficient, long-lasting operation. Write today!

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SM-56-3 for the incomparable Spacemaker cylinder.

HSM5-58-4 for the High-Pressure Hydraulic Spacemaker cylinder.

THE TOMKINS-JOHNSON CO. JACKSON, MICH.

CYLINDERS · MILLING CUTTERS · RIVETERS and CLINCHERS

Begins on page 282

covering the effect of income tax on buying decisions. The book also investigates numerous other topics including equipment depreciation, investment funds, and forecasting. Several appendixes contain rates, tables, and references to help compute problems. (Reviewed by Richard L. Grant.)

Principles of Engineering Economy (fourth edition), by Eugene L. Grant and W. Grant Ireson. The Ronald Press Co., 15 E. 26th St., New York 10. 574 pages. $8.

* * *

Industrial Packaging brings together and discusses a variety of material not previously available from one source. Part I describes and explains general uses of all major types of packaging materials and containers; includes basic engineering data. Part II covers methods and equipment.

Industrial Packaging, by W. F. Friedman and J. J. Kipnees. John Wiley & Sons, 440 Park Ave. South, New York 16. 536 pages. $11.50.

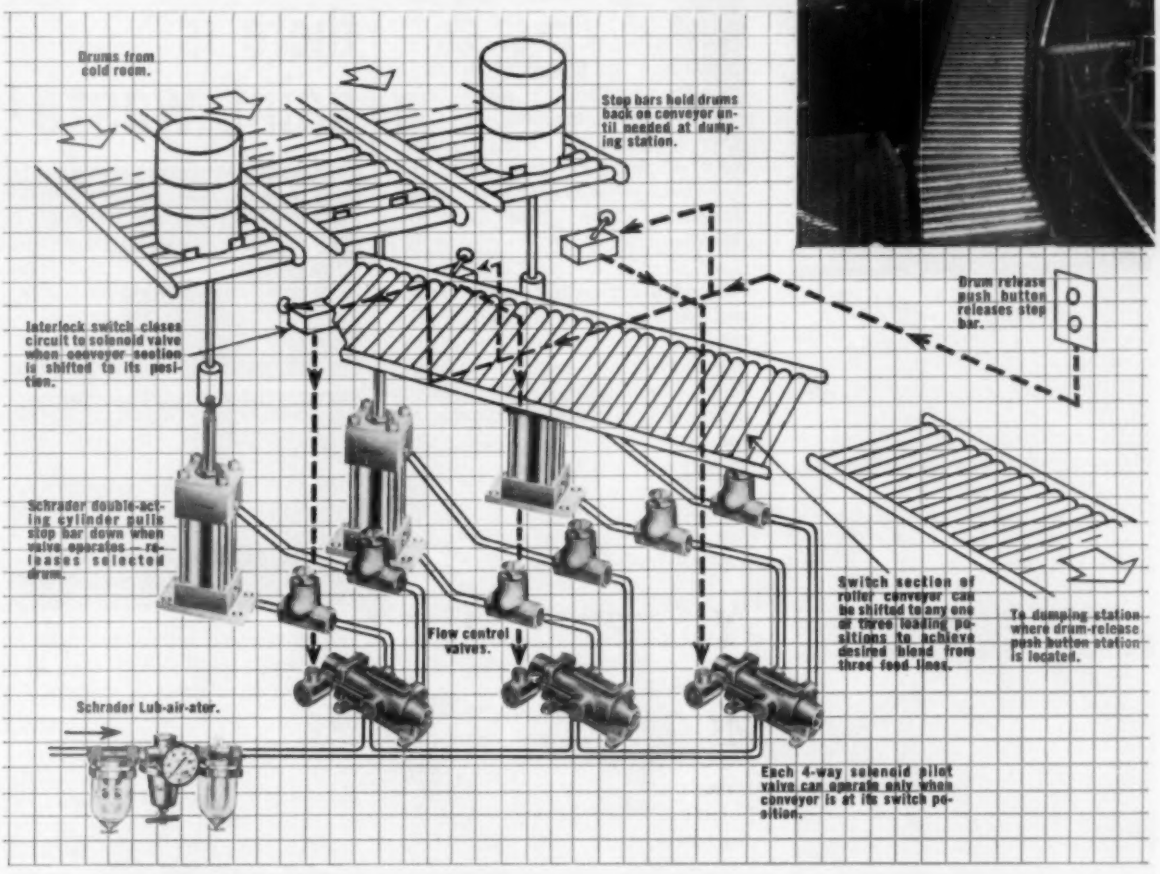
Production Control is a clearly written, easy-to-understand book. Good for those who want to check their present production control systems or need a basic knowledge of the subject. This second edition is loaded with how-to information, including many references to practices of specific companies. It analyzes methods for use in specific situations. Also tells how forecasts are converted into schedules.

Production Control, by Franklin G. Moore. McGraw-Hill Book Co., 330 West 42nd St., New York 36. 655 pages. $8.

Modern Air Conditioning Practice is a concise text covering all the important background on plant engineering needs before tackling the usual run of heat transfer, refrigeration, or air distribution jobs. Characteristics of available commercial equipment are discussed. Plenty of sample heating, cooling, and air-flow problems are worked out in detail. Not much detail on control systems, however.

By Norman C. Harris, McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 363 pages. $6.75.

Processors automate even heavy work with air. In a complex frozen juice concentrate blending operation, Plymouth Citrus Products Cooperative, Plymouth, Fla., hooks up Schrader Air Products simply and economically to a gravity conveyor. Full 55-gal. barrels on feed sections roll down to stop bars and are selected in correct order and ratio for dumping. "The Schrader system performs well," says C. Byron Smith, plant manager. "We're handling 200 to 300 barrels a day on this selective conveyer, and could handle more."


Drums from cold room.
Stop bars hold drums back on conveyor until needed at dumping station.
Drum release push button releases stop bar.
Interlock switch closes circuit to solenoid valve when conveyor section is shifted to its position.
Schrader double-acting cylinder pulls stop bar down when valve operates — releases selected drum.
Flow control valves.
Switch section of roller conveyor can be shifted to any one of three loading positions to achieve desired blend from three feed lines.
To dumping station where drum-release push button station is located.
Schrader Lub-air-ater.
Each 4-way solenoid pilot valve can operate only when conveyor is at its switch position.

PROCESSOR AUTOMATES BACK-BREAKING CHORE WITH SCHRADER AIR PRODUCTS . . . GAINS SPEED, EFFICIENCY, BIG ECONOMIES

Solve difficult problems of handling, conveying and sorting, just like this company . . . with air! Versatile Schrader Air Products take punishing environments in stride, even corrosive atmospheres . . . Work together like magic on American production systems of many different kinds in hundreds of industries.

You already have air. Add Schrader Air Products to push, pull, hold, position, move work repetitively . . . cure headaches of weight, assembly, production maintenance . . . perform tirelessly and with precision. Speedy yet safe Schrader takes the drudge out of work, adopts to special needs, saves time, money and effort.

Select from the full Schrader lines to plan your automation of machines. Your Schrader distributor can help you pinpoint what you need. For more data write:

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Division of Scovill Manufacturing Company, Incorporated
471 Vanderbilt Avenue, Brooklyn 38, N. Y.

QUALITY AIR CONTROL PRODUCTS

LOOK, BOSS... KENNETTS ARE
EXTRA DURABLE!
EXTRA STRONG!
EXTRA LIGHT!
SHOCK-ABSORBING!
QUIET!
They're made of National Vulcanized Fibre, a cellulosic plastic. Come in a "jillion" styles and sizes for any materials handling need.
Get the full, cost-cutting Kennett story now. Write for Bulletin O-6 today.
KENNETT
RECEPTACLES BY
NATIONAL
VULCANIZED FIBRE CO.
WILMINGTON 99, DELAWARE

FACTORY FILMS

Dimensional Gaging with Air depicts actual tests to illustrate basic principles of air gaging. The film discusses various air gaging systems and shows how each system operates. Includes shots of air gages being used in general machine shop, and other applications. 16mm, sound, color, 42 min. For loan, write to:

Federal Products Corp., Sales Promotion Dept., 1144 Eddy St., Providence 1, R. I.

Power-Up demonstrates how power and efficiency of hydraulic circuits can be increased with vane-type pumps. Explains applications in the fields of mobile equipment, field testing devices, many types of automatic and semi-automatic production machinery. 16mm, sound, color, 12 min. Write to:

American Brake Shoe Co., Denison Engineering Div., 1160 Dublin Rd., Columbus 16.

Vapor Compression Distilling Units: Chemical Cleaning shows the fittings, hoses, and tanks necessary for cleaning operations. Film shows how to establish the circulation of the cleaner through the unit, and other processes. 16mm, sound, 20 min. Write to:

United World Films, Inc. (Government Dept.), 1445 Park Ave., New York 29.

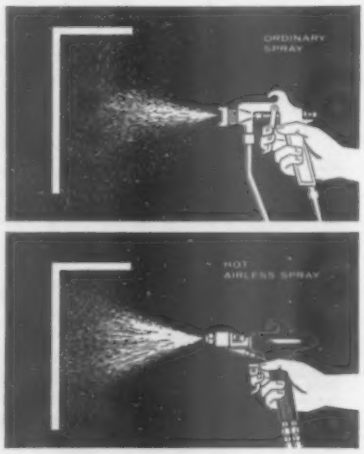
Cast Metals and You tells the story of the role metal castings play in our everyday lives. It depicts the development of this basic industry; shows training programs, laboratory facilities of foundries, and cast metals operations. 16mm, color, sound, 22 min. Write to:

American Foundrymen's Society, Film Library, Golf & Wolf Rds., Des Plaines, Ill.

Work Simplification on Film is a 24-page folder that lists more than 80 16mm films available for rent. Produced by leading U. S. companies, the films have won awards in the annual Methods Improvements Competition sponsored by the Industrial Management Society. For free copy of folder, write to:

Industrial Management Society, 330 S. Wells St., Chicago 6.

where there is paint fog... there is paint waste!



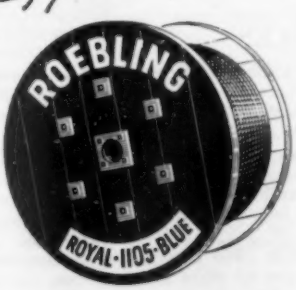
Whenever you see paint fog you see paint waste. Waste that can cost you thousands of dollars.

Nordson, and only Nordson, overcomes this problem of paint waste with a system that employs both heat and pressure — a system that provides maximum control over both cost and quality. With the Nordson Hot Airless System, savings of 30% on coating materials are common. Improved finishes and labor savings, too.

Sound too good to be true? Let us prove our story in your plant spraying your product with your coating material. Write for full information.

NORDSON CORPORATION
37 Jackson St., Amherst, Ohio

When you're talking about a $162,000 dipper shovel, you've got to talk about the best rope for it



Talking about or working with, the same thing applies. Anything below Royal Blue's performance level is simply unrealistic. Like looking for a cut-price brain surgeon.

Even at $162,000, the cost of wire rope is important. That's why so-so ropes can cost you more in the long run, because so-so ropes are *short run*. Royal Blue, on the other hand, is built by America's oldest manufacturer of wire rope to last, to do the job without a whimper. Here's why.

Royal Blue is made from the toughest rope wire ever made—Type 1105—extra high-strength improved plow steel. This pedigree gives to the rope qualities that you can't find in any other rope: exceptional resistance to shock, abrasion, fatigue and impact. Add to these a flexibility that age cannot wither nor hustling fade and you've got a collection of characteristics that make Royal Blue the strongest rope you've ever used.

A $162,000 Dipper Shovel deserves the best and your Roebling Distributor has it . . . Royal Blue. For information, write to Roebling's Wire Rope Division, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities

John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

For more facts Circle 586 on Reader Service Card

With "Ship To" frame pre-printed by carton maker, shipping clerk uses Multistamp Duplicator to address up to 1000 pieces of the same shipment with the same low-cost stencil . . identically, accurately, quickly, easily.

Using Multistamp FORM-CUT stencil, printing the form and fill-in data at the same time is an easy, one-man, one-hand operation. Your form is custom die-cut in the stencils . . you fill them in with ball point pen or typewriter.

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Quickest Way for **Volume Shipping**

EASY-TO-READ FADE PROOF — **QUICK DRYING WATERPROOF**

Shipping department addressing errors are virtually eliminated when address and routing information are printed directly on cartons by the Multistamp Stencil Duplicator. The print becomes an identical smear-proof . . fade-proof . . water-proof . . permanent part of every carton. Following simplified Multistamp Marking Methods, the address stencil is cut in the same typing which fills out shipping order, bill of lading, invoice, and other forms. One typing . . one easy operation.

Write Today for your Free copy of the illustrated new how-to and why book about the Multistamp Marking Methods.

MULTISTAMP
STENCIL DUPLICATOR (R)
THE MULTISTAMP CO. NORFOLK, VA.

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

MAINTENANCE

275—Paints. Here's a functional color kit that's handy for industrial plants using color. Colorizer Associates.

276—Plier-Type Tool. Hand Tool Manual contains helpful application data for plier-type tools. Sargent & Co.

277—Lubricating Device. Catalog describes barrel-to-bearing method of lubricating. Alemite Div., S-W Corp.

278—Paints. Booklet, "How To Save," tells about new metalastic maintenance paints. Sherwin-Williams Co.

279—Lubricants. Informative booklet discusses lubricants: "A Grease Schedule for Cost Control." Texaco, Inc.

280—Floor Wax Cleaner. Literature describes liquid wax-soap for cleaning waxed floors. Finnell System, Inc.

281—Rustproofing Coatings. New "Color Horizons Systems" catalog has 110 color standards. Rust-Oleum Corp.

282—Lubricants. Free "Lubriplate Data Book" is a useful treatise. Lubriplate Div., Fiske Bros. Refining Co.

283—Protective Coatings. Information on protective coatings for corrosion prevention. Koppers Co., Inc.

284—Machine Mounts. Book describes various features of vibration control mounts. Unisorb Div., Felters Co.

285—Asbestos Packings. Booklet SLP-659 gives service conditions, applications, prices. Greene, Tweed & Co.

286—Shop-Van. Catalog describes features of self-propelled maintenance workshop on wheels. Vanguard Mfg. Co.

287—Lubricants. New book, "Organized Lubrication—Major Cost Control Factor" free on request. Texaco, Inc.

PLANT SERVICES

288—Steel Shelving. Catalog describes various features of adaptable open and closed shelving. Borroughs Mfg. Co.

289—Adjustable Storage Racks. Literature on open-end, drive-in, or drive-through racks. American Metal Products Co.

290—Safety Cans. Latest 1960 catalog lists maker's complete line of oilers and safety containers. Eagle Mfg. Co.

291—Dry Dust Collectors. Brochure, "Freedom From Dust," has 28 pages of technical, application data. Dracco Div.

292—Pneumatic Controls. New condensed catalog lists line of pneumatic control equipment. Johnson Service Co.

293—Steel Pipe. Bulletin 509 describes typical installations, includes technical tables. National Supply Co.

294—Multi-Person Showers. New bulletin H-1322 provides details on five-shower unit. Bradley Washfountain Co.

295—Heat Transfer. Bulletin P60 gives complete data, mechanical features, and applications. Tranter Mfg., Inc.

296—Storage Cabinets. Illustrated catalog (20 pages) describes modular-type storage cabinets. Vidmar, Inc.

297—Heat Exchangers. Bulletin No. 132 gives details; capacity 7,000,000 to 18,000,000 Btu/hr. Niagara Blower Co.

298—Steel Shelving. Catalog (92 pages) gives information on clip and stud shelving. Lyon Metal Products, Inc.

299—Dust Collectors. Illustrated literature tells about self-contained portable dust collectors. Aget Mfg. Co.

300—Modular Work Stations. Bulletin 158 gives complete facts on changeable bench layouts. Products For Industry.

301—Valves. Catalog describes three-way palm-button valve for dependable air control. Airmatic Valve, Inc.

302—Industrial TV. Write for information and copy of "Guide to TV in Industry" on closed circuit TV. Philco Corp.

303—Hand Cleaner. Literature gives information on new Lan-O-Kleen plus hand cleaner. West Chemical Products.

304—Water Meters. Descriptive literature covers heavy duty disk and turbine type meters. Badger Meter Mfg. Co.

305—Measurement, Control Devices. Literature describes complete line for wide applications. Rockwell Mfg. Co.

306—Dust Filters. Bulletin G-30 is filled with facts, specifications, and dimensions on dust filters. The Day Co.

307—Pipe, Tubular Products. Catalog gives complete mechanical data, specifications, standards. A. M. Byers Co.

Turn the page

NEW!
SKIL RECIPRO SAW
2 SPEEDS FOR WOOD
AND METAL CUTTING

NEW! SKIL ½"
RIGHT ANGLE DRILL
USES SELF-FEEDING BITS

Two of the work-savingest tools you can own!

NEW SKIL RECIPRO SAW

Cuts anything that can be cut by hand—faster, easier and better. Does the work of keyhole, hack and handsaws 5 to 20 times quicker.

Two separate speeds—LOW for fast metal cutting with minimum blade wear, HIGH for wood and compositions.

Off-center blade cuts close to walls and corners—blade reverses in clamp for right or left situations.

Saves blades, too! When one section wears, shoe easily repositions for cutting with unused part of blade.

NEW SKIL RIGHT ANGLE DRILL

Lets you drill freely between joists and studding, in tightest quarters. And with new self-feeding bits you drill large holes —from 1¼" to 2⅜"—without bearing down on the tool!

Handles any drilling job—Right angle drive unit mounts two ways to give a low speed for boring large holes, or a higher speed for smaller holes. For straight-line drilling, simply remove unit. Comes complete with carrying case and 2⅜" self-feeding bit.

Ask your Skil distributor to demonstrate these work-saving Skil tools. He's listed under "Tools—Electric" in the Yellow Pages. Or write for full information to Skil Corporation, 5033 Elston Avenue, Chicago 30, Illinois, Dept. 117D.

SKIL ...and SKILSAW POWER TOOLS

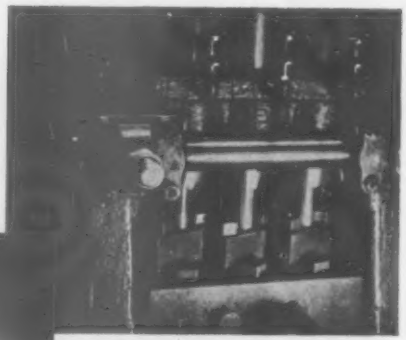
For more facts Circle 588 on Reader Service Card

PACKINGS...
for Long-Service Savings

"LONG-LIFE" RED SHEET

For packing flanges and other parallel surfaces in service against hot and cold water, air, saturated steam pressures up to 150 lbs., and all hydraulic applications. Pliable, strong and firm to hold required pressures.

Thicknesses: 1/32", 1/16", 3/32", 1/8", 3/16", 1/4". Max. Width: 48"



"LONG-LIFE" MOLDED-LIP AND O-RING PACKINGS...

FOR AIR, GAS, OIL, CHEMICALS, STEAM, WATER, SOLVENTS

"If it's GOODALL, it MUST be Good!"

Contact Our Nearest Branch for Details and Prices

Standard of Quality—Since 1870

HOSE · BELTING · FOOTWEAR · CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.

BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES. IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

ADVERTISERS' LITERATURE

Begins on page 288

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

MECHANICAL

308—Gears. Catalog No. 57 lists over 2000 types of gears for varied applications. Boston Gear Works.

309—Speed Reducers. Catalogs describe line with ratio of 6.2:1 to 985:1; capacity to 100 hp. Link-Belt Co.

310—V-Belt Drives. Free booklet, "The Modern Way to Design Multiple V-Belt Drives." Gates Rubber Co.

311—Roller Chains, Sprockets. Book 2657 has 154 pages of helpful data for varied applications. Link-Belt Co.

312—Chain Drives. Catalog lists features of maximum service life, self-lubricating chain. Whitney Chain Co.

MATERIAL HANDLING

313—Screw Conveyors. Book 2989 gives complete information on quik-link screw conveyor component. Link-Belt Co.

314—Electric Hoist. Bulletin 15010-15C has facts on 1-ton pushbutton electric hoist. Manning, Maxwell & Moore, Inc.

315—Storage Racks. Complete catalog lists line of storage and materials handling racks. Equipment Mfg., Inc.

316—Industrial Trucks. Booklet, "Methods and Ideas," and bulletins on maker's line are available. Barrett-Cravens Co.

317—Overhead Conveyor Systems. Planning folder, catalogs, plant and conveyor planning grids tell all. Chainveyor Corp.

318—Conveyor Systems. Complete conveyor catalog contains full data on custom engineered systems. Lamson Corp.

319—Pneumatic Tube Systems. Complete information on automatic airtube carrying systems. Lamson Corp.

320—Palletainers. Describes features of warehouse-types. Capacities: 3000 to 4000 lb. Union Steel Products Co.

321—Conveyors. Handbook of material-handling ideas; application information and suggestions. Rapids-Standard Co.

322—Tote Boxes. Bulletin FM gives details on fast, simplified handling method. Powell Pressed Steel Co.

323—Self-Dumping Hopper. Complete details upon request. Capacities from ½ to 2 yd. Roura Iron Works, Inc.

Turn the page

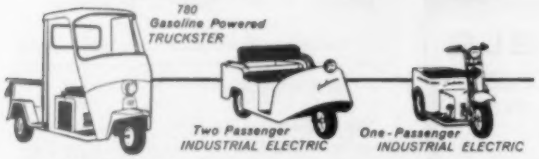
Beechcraft
speeds intra-plant deliveries with
CUSHMAN
ELECTRIC TRUCKSTERS®

Beech Aircraft Corporation of Wichita, Kansas is "shrinking" the expanses of its 26-acre Plant I in Wichita by using two silent, fumeless Cushman Electric Trucksters to speed the movement of materials, personnel and aircraft parts between buildings.

Highly maneuverable—able to move through 50-inch passageways—the husky Cushman Electric Truckster carries a half-ton payload . . . travels up to 50 miles on a charge.

- Rigid unitized construction
- Heavy duty rear suspension
- Heavy duty batteries and motor
- New positive drive for maximum grade-pull power
- May be equipped as personnel carrier
- Optional fiber glass cab

ELECTRIC TRUCKSTER
5 Passenger Model

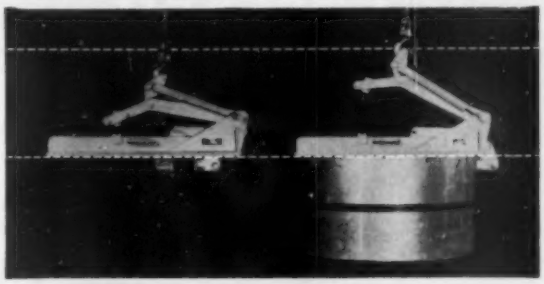


Ask your dealer for demonstration or write for information

CUSHMAN MOTORS
975 No. 21st, Lincoln, Nebraska
A subsidiary of Outboard Marine Corporation, maker of Johnson and Evinrude outboard motors

For more facts Circle 590 on Reader Service Card

NEW
HEPPENSTALL COIL TONGS



stack large and small diameters to within 24 inches of the crane hook

Only two feet high at greatest extension, these new Heppenstall Tongs put more coils into less space, faster. By simple manual adjustments, these tongs handle inside diameters as small as 5 inches and up to 20 inches, outside diameters from 6 to 40 inches, with a 1,000 pound capacity rating. Custom models of this same design will handle coils up to 3,000 pounds. For more information and a quotation, call your Heppenstall Company Representative or send us your load and operating requirements. Heppenstall Company, Materials Handling Division, New Brighton, Pennsylvania.

HEPPENSTALL COMPANY
Pittsburgh 1, Pennsylvania
PLANTS: Pittsburgh, Pa. • Bridgeport, Conn. • New Brighton, Pa.

MIDVALE-HEPPENSTALL COMPANY
Nicetown, Philadelphia 40, Pa.

Die Blocks • Forgings • Back-Up Roll Sleeves • Rings • Industrial Knives • Materials Handling Equipment • Pressure Vessels • Hardened and Ground Steel Rolls • Vacuum and Consumable Electrode Melted Steels

IF IT HANGS FROM A CRANE HEPPENSTALL CAN HANDLE IT

For more facts Circle 591 on Reader Service Card

CHECKED YOUR TRACKWORK LATELY?

is your trackwork an asset or liability?

Is your track system up to par? Weak spots in your track layout can disrupt production flow — may cause costly derailments.

Whether you need replacement or a new track layout "West Virginia" brand trackwork can save you money.

Write for free "Trackwork Inspection Checklist." Regular trackwork checks can save you costly traffic delays.

Department "R"
P. O. Box 118
Huntington, West Va.
Phone: JAckson 9-7171

CONNORS STEEL DIVISION

PORTER

H.K.PORTER COMPANY, INC.

For more facts Circle 592 on Reader Service Card

MAKE SHORT WORK OF LONG LISTS!

ACME VISIBLE PHOTO PANELS

Just slip in a new card instead of retyping a whole list

Make changes in minutes! Each item on your price or parts list . . . your catalog, directory or index is typed on a separate card. This slips securely into an Acme Visible Photo Panel . . . ready to be photographed for duplicating. No type to set. And, to make changes, just remove old cards, type and insert new ones. No redoing. Acme Visible can also prepare and maintain lists for you. Send coupon for details.

ACME VISIBLE

Acme Visible Records, Inc., 3104 West Allview Drive, Crozet, Va.
Please send free booklet on Photo Panels for time saving preparation of directories, catalogs, price and parts list, etc.

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Title_____

Company_____

Address_____

City_____ State_____

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ADVERTISERS' LITERATURE

Begins on page 288

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

324—Conveyors. New handidrive handbook tells how to cut planning, installation costs. Standard Conveyor Co.

325—Cranes. Bulletin C-42 lists performance data and features of heavy-duty cranes. Harnischfeger Corp.

326—Electric Hoist. Bulletin H-55 has complete information on new hevi-lift electric hoists. Harnischfeger Corp.

327—Lift Trucks. Brochure (No. 5265) describes trucks with 2000-3000 lb. capacities. Yale & Towne Mfg. Co.

328—Truck Batteries. Informative booklet, "Extra Dividends," covers maker's line. Thos. A. Edison Industries.

329—Fibre Containers. Bulletin O-6 has cost-cutting facts on fibre containers. National Vulcanized Fibre Co.

PACKAGING, SHIPPING

330—Marking Systems. Bulletin on touch-stenciling methods is packed with ideas. Weber Marking Systems, Inc.

331—Stencil Duplicator. New illustrated how-to (and why) book describes stencil duplicator. The Multistamp Co.

PRODUCTION

332—Drill Press. Free Catalog shows 61 machines, 302 models, and over 1400 accessories. Rockwell Mfg. Co.

333—Dual-Drive Lathe. Bulletin 6A gives features of high-precision lathe. R. K. Le Blond Machine Tool Co.

334—Automatic Painting Machines. Brochure describes product finishing equipment. Conforming Matrix Corp.

335—Air Drill. Free copy of bulletin (53-B) describes E-01P air drill—operates at 950 rpm. Rotor Tool Co.

336—Solvent Degreasing. Informative paper, "Solvent Degreasing," describes process. Detrex Chemical Industries.

337—Visible Records. Booklet tells about use of photo panels in preparing records. Acme Visible Records, Inc.

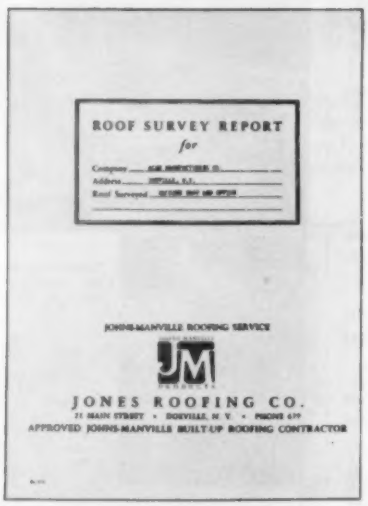
338—Marking Devices. Literature describes marking, stamping, stenciling products. Speedry Products, Inc.

339—Data Processing. Brochure S-500 covers system for getting fast, accurate information. Royal McBee Corp.

Turn the page

Borrow these trained eyes to check your roof completely...

YOUNG ROOFING CO., ST. LOUIS, MO.



EXCLUSIVE. NO OBLIGATION—*You get a detailed report like this, covering your roof and all its needs.*

Could you spot ALL the places a roof can fail and cost you thousands of dollars? The approved Johns-Manville Roofing Contractor near you has both the knowledge and experience to locate troubles before they happen . . . and knows what to do about them. He shows you how to budget the whole job to avoid heavy expense.

With a J-M Roof Survey–available to you without obligation–you get a report on present defects. More important, it points out future trouble spots too. And it recommends clearly and concisely what to do and what the cost will be–using quality Johns-Manville Roofing Products and the services of your J-M Contractor.

Borrow his trained eyes today. He's listed in the Yellow Pages of your phone book under "Roofers." Or write Johns-Manville, Box 158, Dept. FA-4, 22 East 40th Street, New York 16, N. Y. In Canada, address Port Credit, Ontario.

JOHNS-MANVILLE

J-M 7★ 7-STAR VALUE PRODUCTS

SEALMASTER

"L" SERIES

A HIGH QUALITY LINE OF MALLEABLE HOUSED BEARING UNITS AND BEARINGS AT A COST THAT IS WARRANTED ON YOUR MACHINE!

ECONOMY PERFORMANCE QUALITY

LF 3-BOLT FLANGE UNIT

Available in pillow blocks and two or three bolt flange units for flush or recessed mounting. All units in the "L" Series available with the new SEALMASTER contact type seal.

LP PILLOW BLOCK

LF FLANGE UNIT

LFT FLANGE UNIT

WRITE FOR BULLETIN 359

SEALMASTER®

SEALMASTER BEARINGS
A DIVISION OF
STEPHENS-ADAMSON MFG. CO.
1 RIDGEWAY • AURORA, ILL.
PLANTS LOCATED IN: LOS ANGELES, CALIF. CLARKSDALE, MISS. • BELLEVILLE, ONTARIO

ADVERTISERS' LITERATURE

Begins on page 288

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

340—Signs, Nameplates. Booklet FF-1 has data on machine for making signs. New Hermes Engraving Machine Corp.

341—Scales. Bulletin 2017 lists complete line of printweigh scales for varied applications. Toledo Scale Co.

342—Cylinders. Engineering catalog on cylinders for either air or hydraulic application. Tomkins-Johnson Co.

343—Photoelectric Control. Full details and specifications show varied applications. Cramer Controls Corp.

344—Data Processing. Brochure describes Print-Punch machines for extending data processing. Dennison Mfg. Co.

345—Schedule Board. Booklet X-200 (24 pages) shows application of visual control schedule board. Graphic Systems.

346—Photoelectric Controls. Brochure NP-4 gives data on automatic industrial processes. Standard Instrument Corp.

347—Spray Gun. Bulletin A-54-5 has details on new turbulator gun for finishing operations. Binks Mfg. Co.

348—Electric Drills. Catalogs give full information on super-powered ¼-in. and ⅜-in. drills. Albertson & Co.

349—Safety Containers. Catalog of products for handling and dispensing flammable liquids. The Protectoseal Co.

350—Reproduction Materials. Free booklet gives interesting details on photodrawing techniques. Eastman Kodak Co.

351—Staplers, Staples. Free information on complete line for varied fastening applications. Bostitch, Inc.

BUILDING

352—Retaining Walls. Catalog describes bin-type retaining walls, applications. Armco Drainage & Metal Products.

353—Acoustic Panels. Free folder tells how to solve sound control problems easily and quickly. The Eckel Corp.

354—Smokestacks. Bulletin contains full facts on glass-protected stacks, inside and out. A. O. Smith Corp.

355—Roofing and Siding. Bulletin 45 is filled with facts, installation methods, flashing details. The Bettinger Corp.

Turn the page

MICRO LEVER DOLLY

a low cost safe tool to move heavy objects

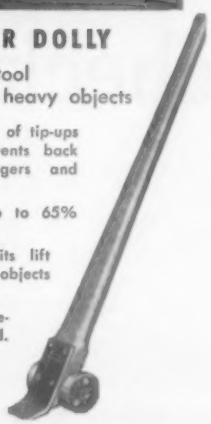
Eliminates the danger of tip-ups and high falls. Prevents back sprains, crushed fingers and pulled muscles.

Cuts moving time up to 65% on large bulky items.

Correct design permits lift blade to pry under objects flat to the floor.

High leverage ratio between power and load.

Four sizes. Metal or rubber wheels. See local distributor or write to—



MICRON, INC., Bettendorf, Iowa

Circle 596 on Reader Service Card

HOW TO RAISE AND DUMP OPEN HEAD DRUMS

USE • Battery electric lift truck with worm gear drum tilter

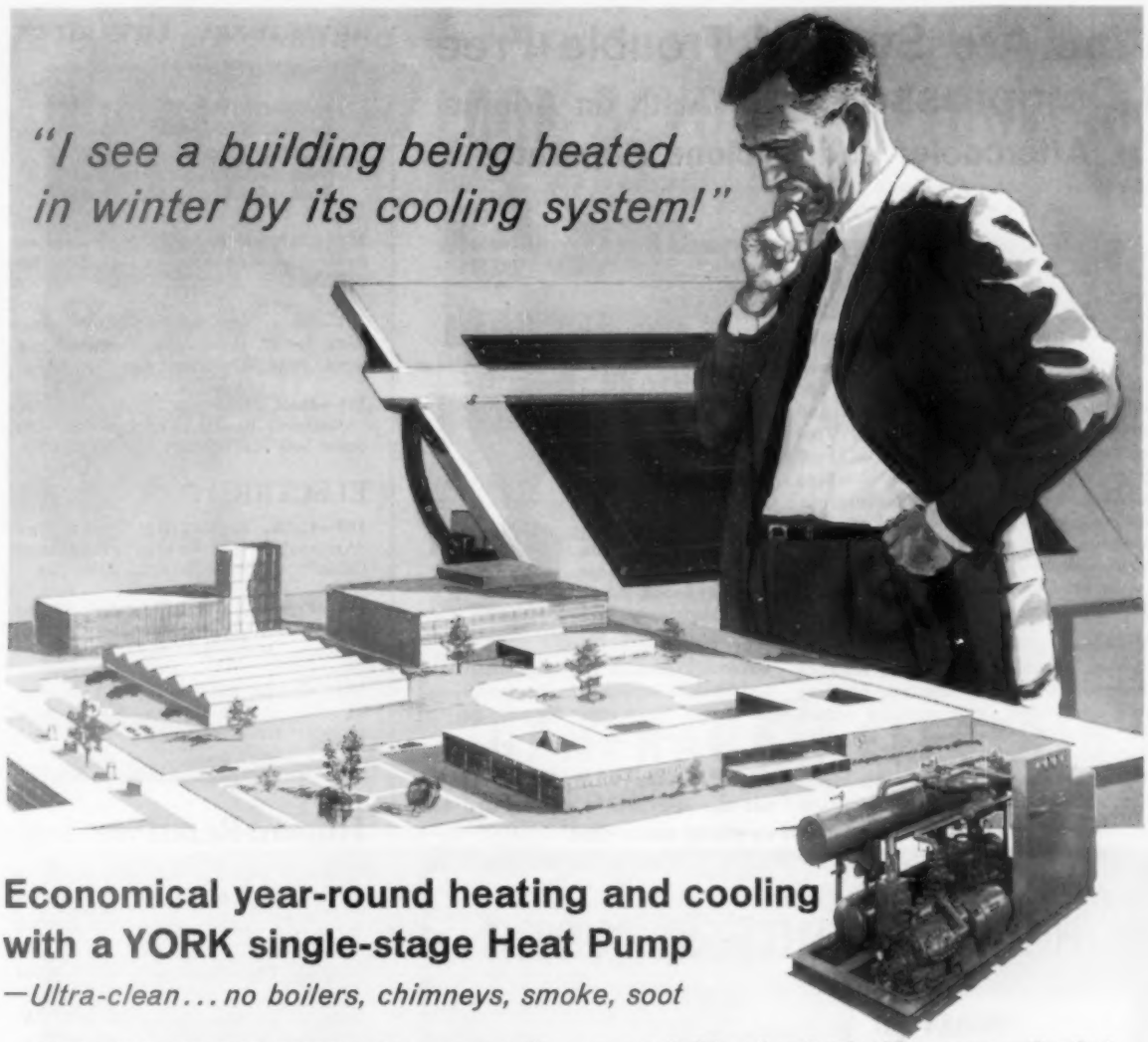
This manufacturer of preserved fruit products pours selected quantities of syrup into mixing vats. In another operation, the Walkie-Worklifter transports filled drums, and dumps into hoppers 8' high. Price $2860.

No other truck saves space like a Worklifter.

ECONOMY Walkie-Worklifter

4527 West Lake Street, ESstebrook 8-9110
Chicago 24, Illinois

Circle 597 on Reader Service Card



Economical year-round heating and cooling with a YORK single-stage Heat Pump

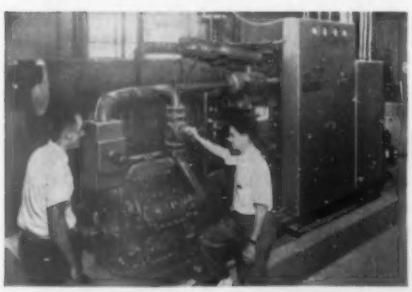
—Ultra-clean... no boilers, chimneys, smoke, soot

USES ONLY AIR AND POWER—One compact all-electric air source unit provides continuous control of temperature-humidity, plus extra cleanliness and safety. Single-stage design keeps initial and operating costs competitive.

CAN HEAT AND COOL SIMULTANEOUSLY—Versatile York Heat Pump can take heat from one area of a building needing cooling, and move it to another area needing heat. Can also utilize waste heat from exhaust air, processing, etc.

SAVES MONEY AND SPACE—No unsightly chimney to build and maintain. No space-wasting fuel storage. No boilers to tend or furnaces to feed. No boiler insurance to buy or boiler water to treat. No flames, fumes or odors.

COMPLETELY FACTORY ASSEMBLED—Saves design time and installation costs. Units are clean, tight and factory pre-tested for reliability. Packaged single stage systems are available up to 150 tons cooling and up to 750 MBH heating at 20°F. Compound compression systems also available up to *150* tons and *1200* MBH heating at 0°F.



Another YORK Trail Blazer Concept Proved In Action At *Morgan County Hospital, Madison, Ga.* —York single-stage Heat Pump provides healthful coolness in summer and clean, odorless heat in winter for year-round comfort of patients and medical staff. Factory assembled unit delivers 50 tons of cooling and 230 MBH heating at 10°F.

YORK

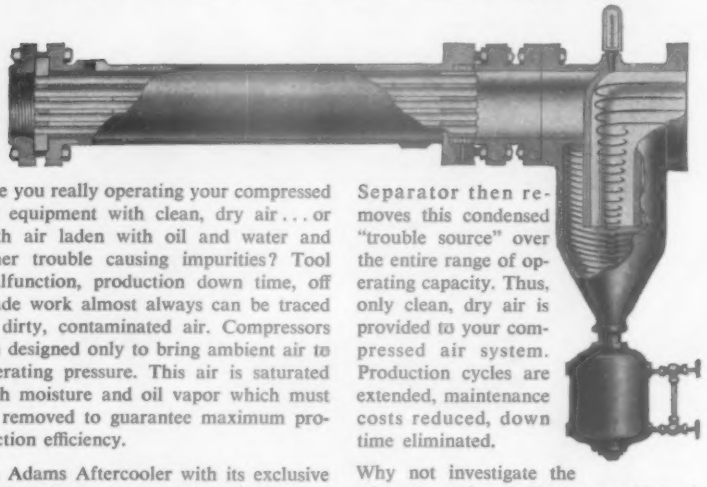
YORK CORP., SUBSIDIARY OF BORG-WARNER CORP., 4704 SOUTH GRANTLEY RD., YORK, PA.

YORK B/W DIVISION

BORG-WARNER RESEARCH & ENGINEERING MAKE IT BETTER

Air Conditioning, Heating, Refrigeration and Ice-Making Equipment • Products for Home, Commercial and Industrial Applications

You Are Sure of Trouble Free Compressed Air...with an Adams Aftercooler and Cyclone Separator



Are you really operating your compressed air equipment with clean, dry air . . . or with air laden with oil and water and other trouble causing impurities? Tool malfunction, production down time, off grade work almost always can be traced to dirty, contaminated air. Compressors are designed only to bring ambient air to operating pressure. This air is saturated with moisture and oil vapor which must be removed to guarantee maximum production efficiency.

An Adams Aftercooler with its exclusive Cyclone Separator, is specifically designed to remove unwanted water and oil from your compressed air. A standard Adams unit cools the compressed air to within 10° of the cooling water temperature for the condensation of oil and water vapor. The Adams scientifically designed Cyclone Separator then removes this condensed "trouble source" over the entire range of operating capacity. Thus, only clean, dry air is provided to your compressed air system. Production cycles are extended, maintenance costs reduced, down time eliminated.

Why not investigate the advantages of an R. P. Adams Aftercooler and Cyclone Separator in your compressed air system. Write today for your copy of Bulletin 714.

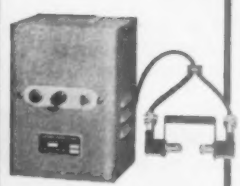
R. P. ADAMS CO., INC.

215 East Park Drive, Buffalo 17, New York

For more facts Circle 599 on Reader Service Card

POST DECITRON ELECTRONIC PRODUCTS

Photoelectronic Controls



Model K-1 with Miniature Photohead

This is a general purpose photoelectric control whereby the interruption of a light beam in the photohead closes a relay which can be used to activate an external circuit.

Model K-3

The K-3 control differs from the K-1 in that the output relay will not energize for each interruption of the light beam, but only if interruptions cease. Can be used to detect "flow" stoppage.

Model H-21-C

The compact, long life, *miniature* photohead . . . ideal for mounting in limited space. May be furnished with alignment brackets to insure proper relation of light source and receiver.

Decitron

ELECTRONIC PRODUCTS DIVISION

Post Machinery Co. | 159 Elliott St., Beverly, Mass.

For more facts Circle 600 on Reader Service Card

ADVERTISERS' LITERATURE

Begins on page 288

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

356—Complete Buildings. Literature on styles and sizes with variety of color combinations. Stran-Steel Corp.

357—Floor Plate. Bulletin SD-S10 gives facts, safety, installation, long-wear features. Alan Wood Steel Co.

358—Roof Coatings. Free booklet, "Aluminum Roof Coatings Make Time Stand Still". Aluminum Co. of America.

ELECTRICAL

359—Cable. Booklet (DM-5903) is titled "Anaconda High-Voltage Durasheath Cable." Anaconda Wire & Cable Co.

360—Precision Switch. Catalogs 83 and 84 give facts on line of explosion-proof switches. Micro Switch.

361—Graphic Recorder. Catalog Section 48 has information on multi-purpose recorder. Esterline-Angus Co.

Human Relations Help

If that's what you want, look at the list below. It's FACTORY's list of reprinted articles on human relations. Titles tell you the specific subject. Pick those you want, order them (by code number) from FACTORY Reader Service, 330 W. 42nd St., New York 36. Send cash, or ask us to bill you. (Quantity prices on request.)

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A146 Every Boss a Mediator
A156 Tips to Better Delegating
A172 Sure Way to Measure Managers
A185 How to Measure Your Managers
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A67 The Foreman on His Job
A117 Forecast: More Women in More Jobs in More Plants
A126 Taking the Doubletalk Out of Communications
A138 Manpower Yardsticks
A144 Truth About the Older Worker
A153 Tips to Successful Discipline
A170 Handling the Problem Worker

There's more to selecting water coolers than meets the eye...

LOOK BEYOND THE OBVIOUS

It will pay you to consider the *total* value found only in General Electric water coolers—that is, the best combination of performance, appearance, price, delivery, warranty protection, and service.

You'll find General Electric water coolers are years-ahead in offering this TOTAL VALUE. General Electric coolers feature clean, modern lines, a stainless steel top, and a harmonious gray finish to fit into any décor. They're economical too! Thirteen models (hot-and-cold, pressure and bottle types) are moderately priced. Operating costs are negligible.

CHECK THE YELLOW PAGES for your General Electric distributor. He can deliver the units you need immediately. A written one-year warranty on all parts and five-year replacement agreement on the refrigeration system help you avoid major repair costs. Also, nationwide General Electric service centers are always close at hand.

Add to this General Electric's long years of leadership with water coolers and you can see that only General Electric gives you TOTAL VALUE for the water coolers you buy. 761-4

GENERAL ELECTRIC

For more facts Circle 601 on Reader Service Card

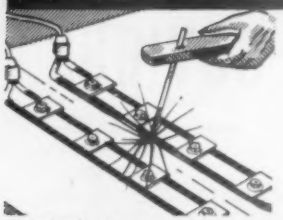
Functional Design + Quality Materials + Precision Control
Facilities + Service Accessibility = TOP CRANE VALUE

THE FAMED
EUCLID
FORMULA PROVIDES
YEARS OF LASTING
CRANE SERVICE
Name any specific industry! We'll tell you what cranes of ours and where they are at work bolstering the fine EUCLID REPUTATION.
FOUNDRIES, STEEL MILLS, STEEL FABRICATORS, SHIPBUILDERS, GENERAL MANUFACTURERS, PAPER MILLS, WAREHOUSES all know the multifold merits of EUCLID-made cranes.
This 10 ton, cab operated crane with top running trolley and catwalk for servicing, works daily in an assembly bay in the world's largest veneer machinery manufacturer's plant.
EUCLID
THE EUCLID CRANE & HOIST CO. 1365 Chardon Road • Cleveland 17, Ohio
WRITE FOR THE CRANE CATALOG

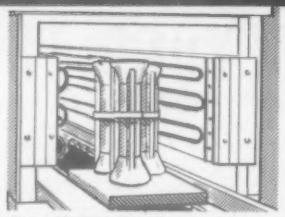
REQUEST A SURVEY of your present facilities by a QUALIFIED EUCLID REPRESENTATIVE

For more facts Circle 602 on Reader Service Card

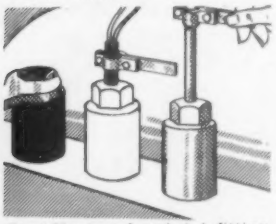
Call your CHROMALOX Man for heating answers



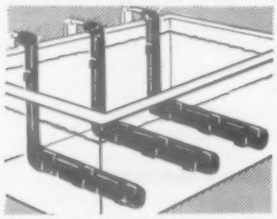
Tubular Heaters used to preheat welding plate to provide more ductile welds.



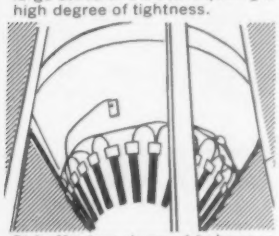
Far-Infrared Panels mounted in an oven for conveyor line heat treatment of metal parts.



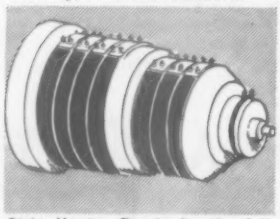
Stud Heaters for shrink fitting large studs and bolts requiring a high degree of tightness.



Immersion Heaters for melting metals such as lead, solder, tin, stereotype metal and babbitt.



Strip Heaters clamped to hopper are thermostatically controlled to keep clay in storage at 60°F.



Strip Heater Bands for the full range of extrusion and injection molding temperatures.

SOLIDS? Only CHROMALOX heats so many things... so many ways

There's one best way to do any job. And you get the best results only by using that one best method.

Regardless of what your heating problems may be . . . your best chance of finding the best answer is to call your Chromalox Man.

- He represents more than 15,000 different types, sizes and ratings of electric heaters and heating elements . . . the world's largest line.
- He orders from the world's largest stock.
- And he is a heating expert . . . he understands your problem and can help you find the answer.

No matter what your heating problem is . . . solids, liquids or gases . . . call your Chromalox Man for the efficient, electrical answer. Or, check the boxes below, write your name, title, and address at the bottom of this page and mail the coupon to us.

Edwin L. Wiegand Company
7500 Thomas Boulevard, Pittsburgh 8, Pa.

☐ Send me Catalog 60 (General Industrial heating applications).

☐ Send me specific information on the heating problems I have outlined on the sheet attached.

☐ Have a Chromalox Representative contact me.

☐ Do not have a Chromalox Representative contact me.

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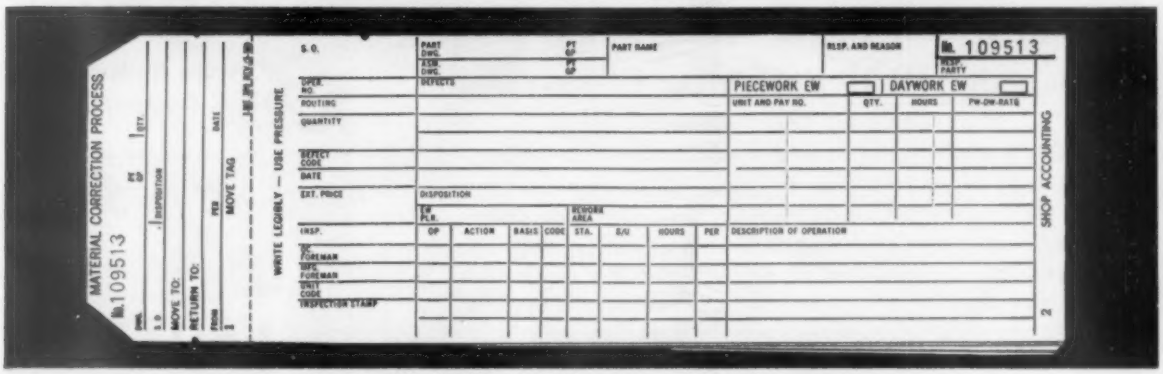
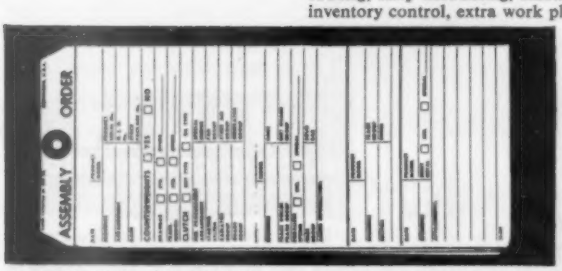
CHROMALOX ELECTRIC HEAT

For more facts Circle 603 on Reader Service Card

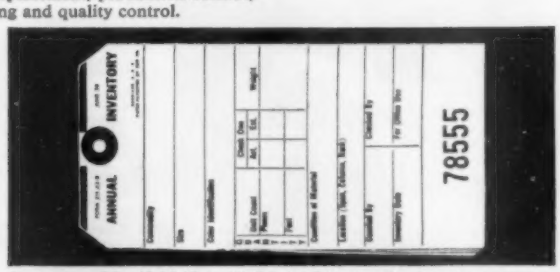
Increasing efficiency of industrial systems with precise information in concise form



Dennison Manifold Tag, consisting of tag and four slips, controls and records a complicated material correction process. Measuring 10¼" x 3¼", it provides space for legible information covering routing, shop accounting, material replacement, production control, inventory control, extra work planning and quality control.



Assembly Order Manifold Tag, an example of Dennison's use of NCR tag stock and paper, combines tag and two slips to communicate information in the neatest, most orderly way. Its actual size is 4" x 9" . . . providing room for about 50 legible entries.



Inventory Manifold Tag, 3⅛" x 6¼" in size, further demonstrates the versatility of Dennison's capabilities with NCR stock. In this case only two legible smudge-free copies are required.

How complicated are your systems?

No matter how many facts your tags must communicate or record, Dennison can create or adapt a tag technique that will reduce your information to its simplest form . . . at lowest practical cost.

NCR Manifold Tags represent one of the most successful means of simplifying complicated communication and recording problems. This "No Carbon Required" multi-copy method . . . made possible by chemicals patented by National Cash Register Company . . . assures smudge-free legibility of up to 7 typewritten or 4 handwritten copies. Easier and cleaner to handle than manifold tags with one-time carbons, NCR manifold tags also assure clearer, neater copies.

Dennison also produces manifold tags with one-time carbons when neatness is secondary to cost. Dennison's growing list of customers for manifold tags includes leading manufacturers in textile, chemical, metal-working and other industries.

Other Tested Tag Techniques now being used by American manufacturers can also help you achieve maximum system efficiency per tag dollar. Your Dennison Industrial Systems Representative can show you tags used to control and record every conceivable plant process or operation from receiving through shipping; single and multi-stub tags, consecutively and serially numbered; special compounds to increase resistance to handling, water, high temperature, acid, alkali and grease; patched and unpatched tags with and without string, wire or special fastening devices. And Dennison can create the tag that's right for you.

To Make a Date, contact the Dennison Sales Office nearest you, or write to Industrial Products Division, Dennison Manufacturing Co.

Dennison

Helping you compete more effectively

FRAMINGHAM, MASSACHUSETTS

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RANSBURG

What Would Paint Savings Like This* Mean in YOUR Finishing Department?

Quality is all important in the production of fine Metalcraft furniture by George Koch Sons, Inc., Evansville, Indiana.

That's why they use the Ransburg Electrostatic Hand Gun to apply a uniform clear coating on their brass-plated furniture. The protective coating is baked on. Although the bulk of their present production is in the popular brass line, they still paint the metal furniture in a variety of colors with the Hand Gun.

Painting is CLEANER ... QUICKER ... CHEAPER *with the Ransburg Electrostatic Hand Gun.*

These chairs and table are typical of the Koch line of metal furniture.

*10 GALLONS OF PAINT NOW DOES THE JOB WHICH FORMERLY TOOK 30 GALLONS

On one item—a TV table—they formerly used 30 gallons of enamel to coat 1000 units by combination dip and air spray method. Now—with the Ransburg Electrostatic Hand Gun, they paint 1000 tables with only 10 gallons. And, they get a better, more uniform coating, too.

NO REASON WHY YOU CAN'T DO IT, TOO!

See how the Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. Or, if your production justifies, it'll pay you to investigate Ransburg's automatic electrostatic spray painting equipment. Write for our No. 2 Process brochures which show numerous examples of modern production painting in both large and small plants.

RANSBURG

RANSBURG
Electro-Coating Corp.
Box-23122, Indianapolis 23, Indiana

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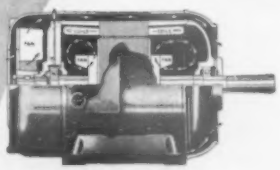
FOR PROVEN ECONOMICAL **POWER**

AIR COOLED

Custom Built . . . NOT Custom Priced



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BALL BEARING MOTOR

Here's real power, custom built to fit your every requirement. Totally enclosed — fan cooled — polyphase 50 or 60 cycles — constant speed — squirrel cage induction — high torque — low starting current — enclosed ball bearing.

Send for complete details Today.

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ELECTRIC CORPORATION
4221 FOREST PARK BLVD. · ST. LOUIS 8, MO.

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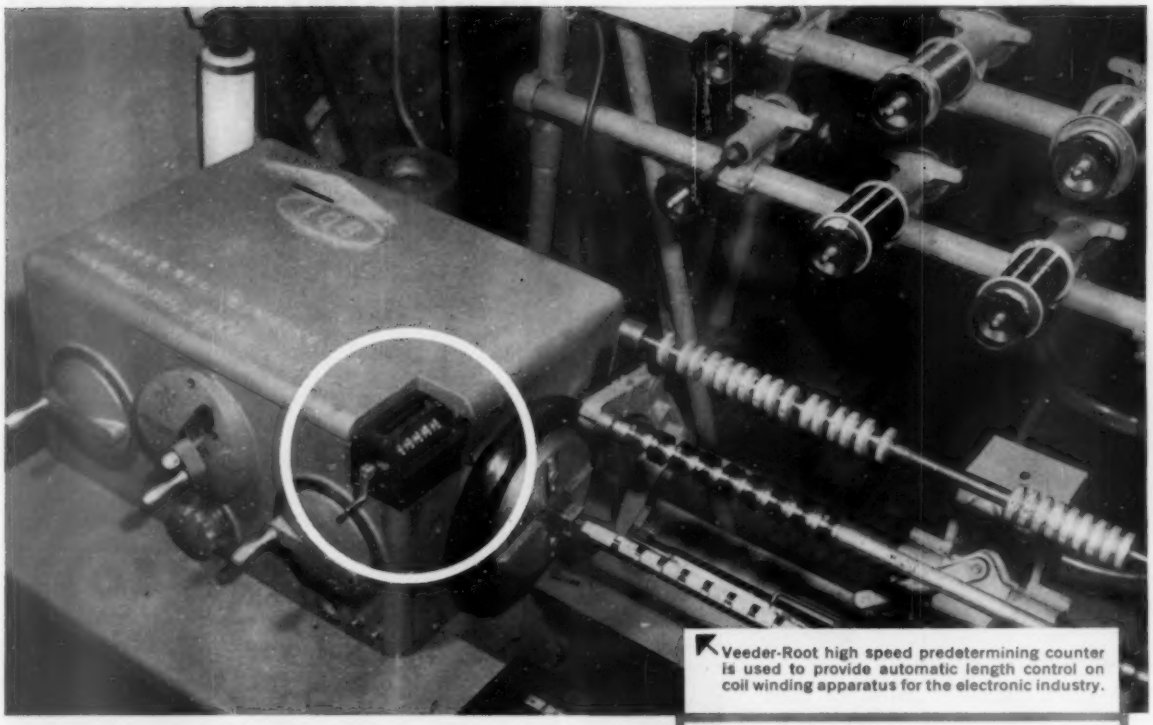

Veeder-Root high speed predetermining counter is used to provide automatic length control on coil winding apparatus for the electronic industry.

Counters Provide Accurate, Automatic Method for Measuring Length

Accurate lineal measuring and recording can plug many of those hard-to-find loopholes in cost and production control.

The method . . . Veeder-Root Counters with modern on-the-spot indication, readout and automatic length control — stopping profit give-away from old-fashioned measuring!

- **Worm Driven Counters** . . . complete measuring unit using groove, plain faced, knurled or rubber faced friction wheels which revolve as material passes under them. Indication in yards, feet, meters or other units as required.
- **Count/Pak Measuring** . . . electric and electronic counters actuated by pulses through a photohead feeding into an electromagnetic counter. Ideal for non-contact measuring.
- **Mechanical Length Control** . . . predetermining counters actuate stop motions or signals when required lengths are reached. Control is automatic, measurement is exact.
- **Electronic Length Control** . . . high speed predetermining counters for non-contact measuring. Counters actuated by pulses through a photohead, easily engineered for special applications, 300,000 counts per minute and sequential stops of 10 or more can be provided.

Let Veeder-Root help you countrol length — and cost!

A Veeder-Root engineer will gladly survey your needs and recommend the specific type of counting device for accurate lineal measuring; or standard counters are available through your local Veeder-Root Distributor. Call or write today for complete information.

Lineal Measuring Counters can be used for

- Metal • Thread • Wire • Braid
- Plastic Film • Rubber • Leather
- Paper • Yarn • Cloth • Tubing

and all roll goods

Quick reset, high speed predetermining counters.

Count/Pak electric and electronic counters.

Electric and electronic predetermining counters.

Lineal measuring (worm driven) counters.

Veeder-Root

HARTFORD 2, CONNECTICUT

"The Name that Counts"

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St. Louis • Greenville, S. C. • Altoona, Pa. • Montreal
Offices and Agents in other principal cities

VR 0-26

Erickson

AR-TIC-U-LA-TED STEERING

TURNS SHORT... LASTS LONG!

This articulated pivot (illustrated above) reduces turning radius to a minimum and gives the advantages of four-wheel steering. It entirely eliminates weaknesses and rapid wear common to complicated conventional steering mechanisms. It is similar to the system used on large, well-known earth movers.

Above is a typical Erickson Low-Lift Platform Truck. Standard models up to 10,000 lbs. capacity. Custom models up to 20,000 lbs. capacity. Platforms custom built up to 6 ft. wide, up to 24 ft. long.

Erickson Hi-Lift Platform Trucks have various platform sizes and lifts available. Stand-up cockpit (as shown) or operator's seat. Standard automotive controls are a feature of all Erickson Platform Lift Trucks.

ERICKSON
the Workhorse of Lift Trucks

Erickson Kart-All materiel-personnel carriers are available with scissors-lift platforms. Airline model shown above has standard baggage bed, 4,000 lbs. capacity. Custom models built with beds up to 8 ft. wide by 24 ft. long, up to 12,000 lbs. capacity. Hydraulic outriggers obtainable for stabilizing Kart-All when loading or unloading heavy loads.

ERICKSON POWER LIFT TRUCKS, INC.

273 St. Anthony Blvd. N. E., Minneapolis 18, Minn.

302 **For more facts Circle 609 on Reader Service Card**

NOW WASH WINDOWS HIGH or LOW *FASTER AND SAFER* with a Tucker Window Washer

HOW TO OPERATE

Custodians all over the country have operated Tucker Window Washers without previous demonstration or observation. If your custodian wants to try a Tucker Window Washer, we will ship prepaid with the understanding that the washer may be returned for cancellation of the charges if not satisfied.

TUCKER WINDOW WASHERS *Feature...*

- **TELESCOPIC HANDLES** Telescoping Aluminum Sections available for lengths up to 66 feet. Sections also come apart for use in other combinations. A 66 foot handle, brush and hose full of water weighs only 20 pounds.
- **AUTOMATIC, VISIBLE DETERGENT** Valve controlled detergent dispenser makes and delivers detergent solution from compressed tablets . . . or clear rinse water as desired. Acrylic tube container shows contents at a glance.
- **COMPRESSED DETERGENT** Compressed Detergent Tablets clean glass, but will not etch paint, stain stone or brickwork, nor injure grass and shrubs.
- **SPECIAL WINDOW BRUSHES** Wide flare brushes with Nylon edges and Polyurethane foam centers wash windows, edges and corners in one swipe.

ONLY TUCKER WINDOW WASHERS can show you how to save time and money in cleaning your inaccessible windows. Up to now, it was necessary to erect costly scaffolding. With a Tucker window wand, it is a simple time and money-saving task to clean those windows . . . and by standing on terra firma. Tucker offers eleven model sizes for most buildings from one to five stories. Most popular size, Model 4, reaches modern 3 stories and older 2 or 2½ story schools. Costs only $69.80 delivered for use without detergent or dispenser.

Available through your favorite Sanitary Supply Dealer . . . or write for full particulars, prices and measuring instructions to . . .

TUCKER MANUFACTURING CO.

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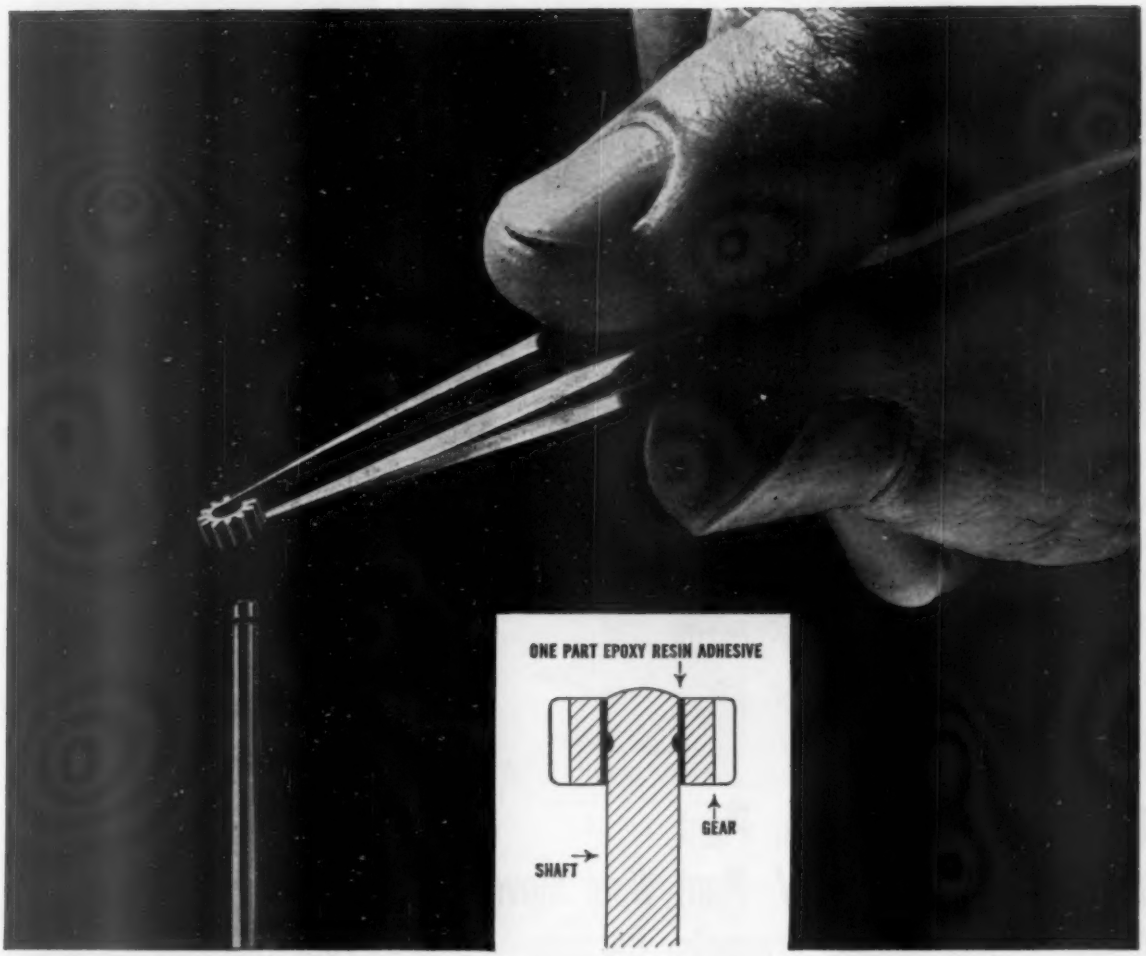

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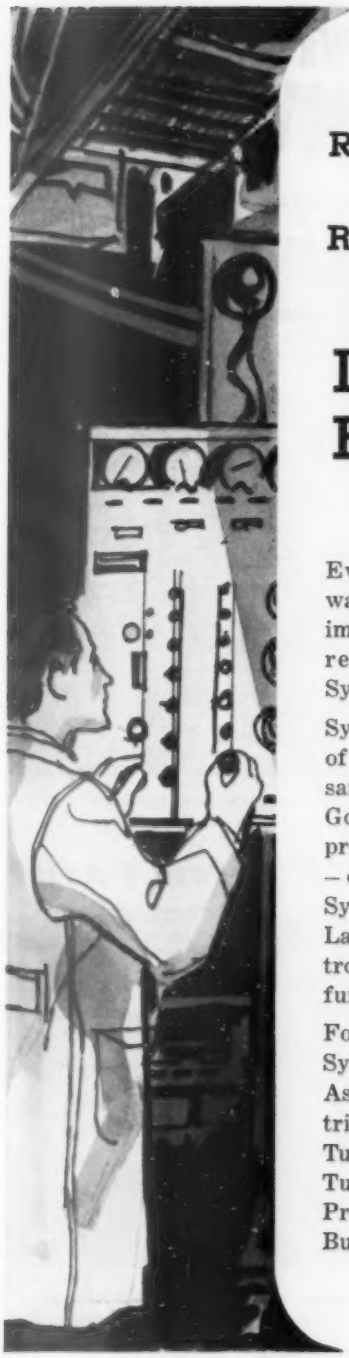

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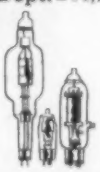

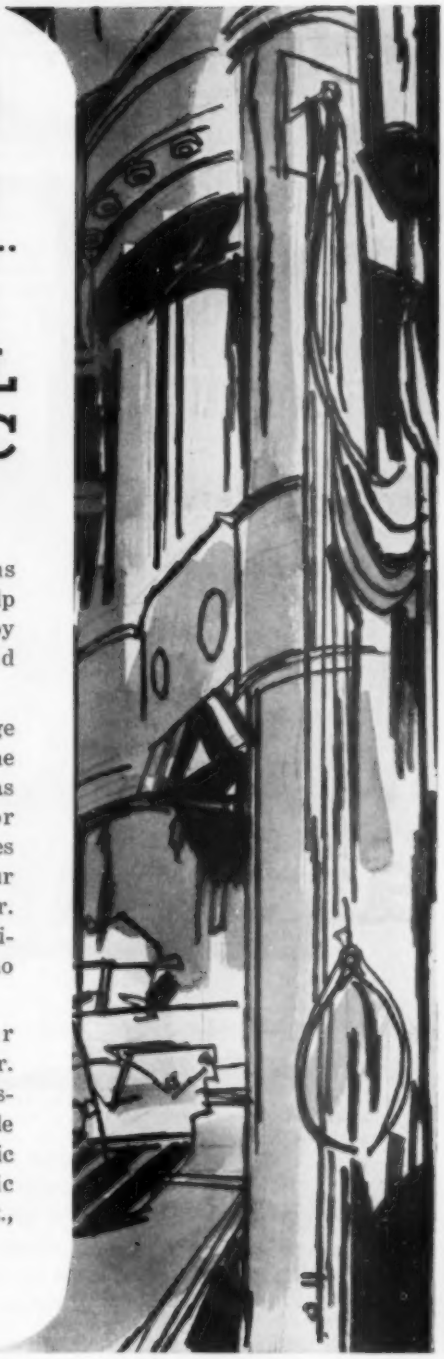

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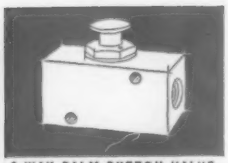

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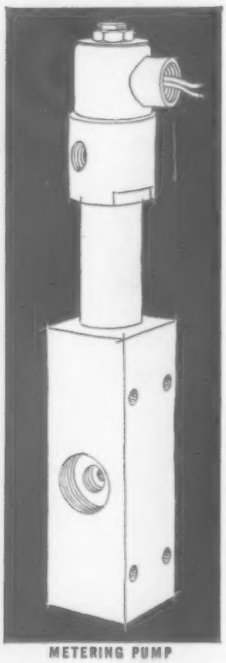

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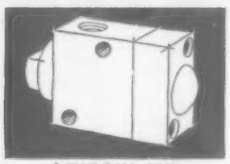

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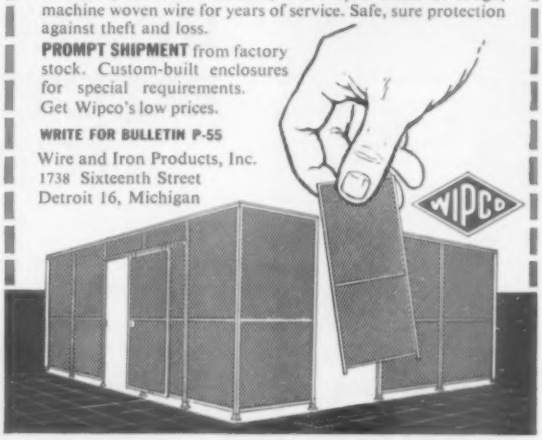

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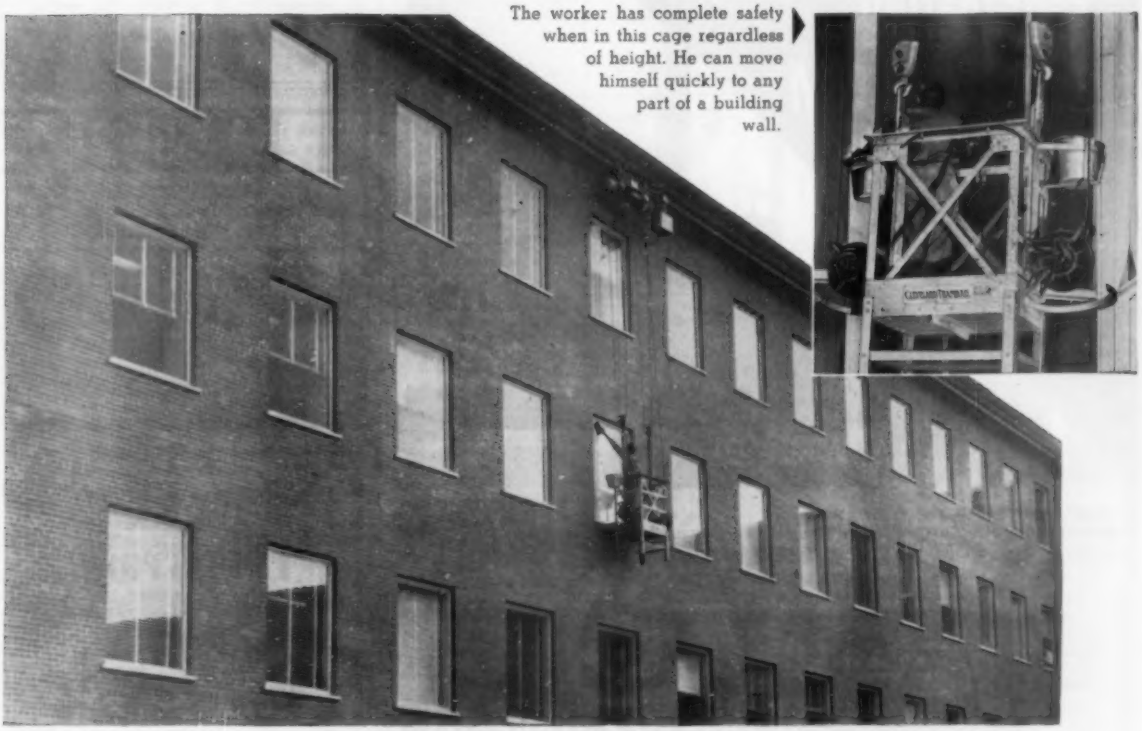

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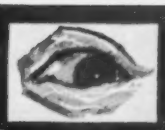

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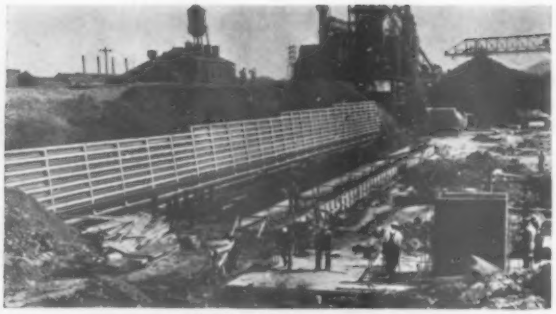

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1—Air Gages
2—Multipresses
3—Power Tools
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5—Machine Tools
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NORpak is a significant advance in the field of static switching. Like other static systems, **NORpak** performs the functions of machine tool relays, stepping relays, latching relays and timers —all without contacts or motion of any kind.

Like other static systems, **NORpak** is ideal for applications where speed is important—where reliability and long life are essential—where conditions make conventional magnetic devices impractical.

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EASIEST TO APPLY

The transistor NOR unit is the basis of **NORpak.** All logic functions—AND, OR, NOT, MEMORY—can be accomplished with combinations of this single NOR unit.

NORpak is *not* complicated — it's easy to apply to conventional circuits. Units are color-coded for quick identification. Simple DC circuit eliminates worry about phase relationships.

UNMATCHED SPEED

NORpak provides switching at rates up to 25,000 per second—faster than any other industrial static system.

SMALLEST COMMERCIAL PACKAGES

NORpak is available in the form of individual components, or in completely engineered systems. Components are offered in 6 and 20 paks, require only 1/4th the equivalent relay panel space, and weigh less than components of other static systems.

EXTRA DEPENDABILITY

NOR units have been time-tested in computer use for years. They are not subject to wear, will give top performance indefinitely, and provide unfailing circuit fidelity.

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Optional monitor lights give visual evidence of proper performance. Simple dynamic sequence tester checks individual NOR units in operation.

EXPERT APPLICATION HELP

Field specialists, factory-trained in all aspects of **NORpak** can give you on-the-spot answers to any application questions.

NORpak is available as individual components for application to specific control functions, or as completely engineered systems ranging from the smallest to the largest panels

Write for the complete story on **NORpak** *— its theory, application and operation... Square D Company, 4041 North Richards St., Milwaukee 12, Wisconsin*

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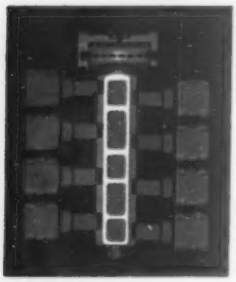
WILL YOUR NEXT BALANCED OPPOSED COMPRESSOR HAVE ALL OF THESE "HIDDEN VALUES"?



No, it won't! Even if you're astute enough to choose Worthington, you'll get only 23 of the 24 "hidden values" pictured below. (Just to pique your interest one is fictitious. For identification of the phony feature, see page 234.)

Compressors should be evaluated on performance, we think you'll agree. But performance is determined by factors which aren't easily checked against service conditions and data. These are the factors we call "hidden values." It will pay you to evaluate these values the next time you specify a compressor. Worthington Corp., Clinton Street and Roberts Ave., Buffalo 5, N. Y. 36-8

WORTHINGTON

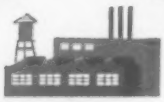
OPTIC COMPARATOR is used to check connecting rod bolt threads for uniform angles, lead and form.

WIRE ALIGNMENT during assembly using electronic equipment minimizes field alignment problems.

FACTORY ASSEMBLY of intercooler and interstage piping reduces installation problems and costs.

COMPOSITION TEST determines constituents of molten iron in each ladle before any casting is poured.

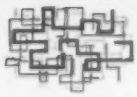
HONING of connecting rod crankpin and crosshead pin ends results in tighter fits, no loose shells.



INTEGRATED DIV. includes foundry, manufacturing, sales, service and engineering in one location.

ULTRASONIC TEST—an advanced method of examining certain critical parts for internal quality.

$1,000,000 ADDITION TO LABORATORY assures sound equipment designs based on actual research.



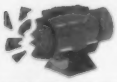
ANALOG/COMPUTER simulates wide range of actual operating conditions for optimum design analysis.

PROFILOMETER inspection of highly finished parts assures easy break-in and long life.

KOLENE PROCESS removes impurities from bearing shell that weaken bond between it and babbitt.

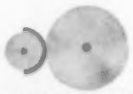
CAST-IN LUBE OIL SYSTEM with internally drilled oil passages eliminates crankcase "plumbing."

MAGNAFLUX AND MAGNAGLO inspections are widely used to expose surface imperfections.

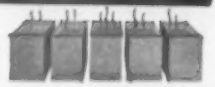


DESTRUCTION TEST of complete compressor cylinders verifies engineers' design calculations.

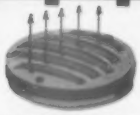
REMOVABLE DOWEL locks piston rod to crosshead—prevents turning due to loosened crosshead nut.



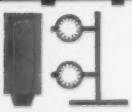
FINISHED GROUND BEARING SHELLS provide positive full-contact backing for long life.



PARCO-LUBRITING of critical wearing surfaces completely eliminates most start-up scuffing problems.



FEATHER VALVE—industry's preferred compressor valve—is efficient, quiet, and low in maintenance.



CROSSHEAD SLIPPER ADJUSTMENT within one-thousandth of an inch assures much longer packing life.

THERMODYNAMICS SECTION analyzes each application to size unit and determine its performance.

STEEL TIE BAR, keyed and bolted in place, strengthens frame and maintains the original alignment.

SALES AND SERVICE INTEGRATION recognizes kinship of one to the other. One man administers both.

ADJUSTABLE ROLLER MAIN BEARINGS feature low friction losses which help to extend compressor life.

AIR CONDITIONED GAUGE ROOM has master gauge blocks constantly used to check instruments.